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ABSTRACT

International Association of Marine Science Libraries and Information Centers (IAMSLIC) conferences provide a format for libraries and information specialists to discuss common interests and concerns so that services and information can be made available to scientists, administrators, engineers, educators and students in the discipline of marine science. The theme of the 1984 conference, "The Year of the Oceans," was addressed in the keynote speech by John Byrne. Presented papers focused on such topics as: National Oceanic and Atmospheric Administration's role in user communications; document delivery in small information centers; data management systems applied to technical reports; journal use; the art of information management; networking and librarianship in Denmark; the ship's library; computer bibliographic searching; microcomputer software; micros in libraries; treaties and marine pollution control; and fisheries information activities. A listing of conference participants is also included. (ML)

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International Association of Marine Science
Libraries and Information Centers
Conference Series

YEAR OF THE OCEANS: SCIENCE OF INFORMATION HANDLING

EDITORS

R.L. GRUNDY AND R.T. FORD

The University of Texas at Austin
Marine Science Institute
Port Aransas, Texas 78373-1267
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10th Annual Conference
of the
International Association of Marine Science
Libraries and Information Centers
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IAMSLIC 1985

3

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Ilene Zaleski, proof reader

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CONTENTS

Contents iii
Preface v
The Year of the Ocean and Exclusive Economic Zone. Byrne, John V. 1
NOAA's role in user communications: a new outlook. Stanley, William. 17
The librarian as records manager: diversification in the library workplace. Oxley, Anna. 27
Document delivery in a small information center. Metzger, Kristen. 39
EPALIT: a data management system applied to the control and retrieval of technical reports. Means, Susan. 59
Journal use study. Norton, Catherine. 85
Accessing DIALOG using your own micro or using public access services. Sieburth, Janice. 109
The art of information management. Shephard, Frank. 119
Society publishing today and tomorrow. Spilhaus, A. Fred, Jr. 129
Evolution and effectiveness of treaties: marine pollution control. McPherson, Mary M. 143
Networking through FISHLINE: state-of-the-art of librarianship in Denmark. Sandfaer, Mogens. 173
The ship's library: a seafaring special library Winn, Carolyn P. 193
Micros in libraries. Dugan, Robert E. 203
Computer bibliographic searching: downloading and uploading using a microcomputer. Wible, Joseph G. 211
Implementing microcomputer software for marine science libraries. Politz, Mary Katherine. 221
Spencer Fullerton Baird and the foundations of American marine science. Allard, Dean C. 233
SEAFDEC's fisheries information activities. Matics, K.I. 253
Fisheries librarianship at Woods Hole. Brownlow, Judy. 269
List of participants 281

PREFACE

"In October 1975, at the invitation of the Research Librarian, Woods Hole Oceanographic Institution, 49 librarians and information specialists from the east coast of the United States and Canada convened at Woods Hole, Massachusetts, U.S.A., to discuss their common interest and concerns in providing library and information services to the scientists, administrators, engineers, educators, and students in the discipline of marine science.

The 'East Coast Marine Science Librarians' group, as it was first known, was restructured in 1978 as a formal, non-profit organization, and adopted the name 'Marine Science Libraries Association.' In 1979, by-laws were formally approved and the name was changed to its present 'International Association of Marine Science Libraries and Information Centers (IAMSLIC)'."

The above statement appears in our "Information Brochure and Membership Application" and provides a short history of IAMSLIC.

IAMSLIC has completed several projects which include the Directory of Marine Science Libraries and Information Centers, an interlibrary loan handbook, a bibliography entitled Selected Readings in Oceanography, and has made recommendations to ASFA about cataloging marine science translations (accepted by ASFA, 1982). Our newest project is the IAMSLIC Union List of Serials (microfiche only).

ACKNOWLEDGMENTS

The 10th Annual Conference was hosted by the Marine Biological Laboratory (MBL), Woods Hole Oceanographic Institution (WHOI), and the National Marine Fisheries Service (NMFS) NOAA, Northeast Fisheries Center at Woods Hole, Massachusetts.

Host Committee included Judy Ashmore (MBL), Chairman, Carolyn Winn (WHOI), Judy Brownlow (NMFS), Ilene Zaleski, Editor, Oceanographic Literature Review, Jane Fessenden (MBL), Bill Dunkle (WHOI) and Cathy Norton (MBL).

University of Texas Marine Science Institute Contribution No. 652.

R.L. Grundy
Program Chairman

THE YEAR OF THE OCEAN AND EXCLUSIVE ECONOMIC ZONE

Keynote Address - John V. Byrne
Administrator, NOAA

The United States has from its earliest days depended upon the ocean for transportation, sustenance, defense, and inspiration. The time is at hand to increase the public's awareness of the importance of the ocean and its resources, to improve our sense of stewardship of those resources and to enhance cooperation in ocean activities between government and private sector.

The Year of the Ocean is designed to accomplish these goals. Its success will be measured by the extent to which all who care about the ocean participate.

It is a great pleasure and privilege to speak to you today. The place of special libraries and information centers in our society has never been more important than it is now. You are needed by scholars and scientists, by businessmen, by technicians and many others. You need to know a great deal about your subject specialties, and you need to hone your skills in the newest in information technology.

And among your responsibilities is that of having broad general knowledge that enables you to make the linkages between your specialties and the wider world outside.

It was within the framework of the last of these characteristics that you suggested my topics for today, The Year of the Ocean and the Exclusive Economic Zone. I am very pleased at this, for it demonstrates your interest in the sweep of America's involvement in the oceans - the past, the present, and the opportunities for the future.

It is always instructive to look to the past, to reacquaint ourselves with the bases

on which we carry out our present-day responsibilities and on which the Year of the Ocean was planned.

The oceans have been of immense importance in the history of the nation. Although the ancestors of native Americans apparently came here by a long-disappeared land bridge from Asia, the modern era was opened by seafarers from Europe, starting with Columbus in the late fifteenth century.

Something over a century later, in 1609, Henry Hudson - frustrated by his inability to find an ice-free passage across Canada - entered New York Bay and sailed 150 miles up what is now the Hudson River. Within a decade several nations had established flourishing settlements along the eastern seaboard. Fishing was the first organized industry of the colonies. After the founding of our Nation it was one of four activities - the others were trade, naval prowess, and later whaling - that established our own seafaring traditions.

I need only recall to you some of the contributions our nation has made to the art and science of ship design - from the clipper ships, to Robert Fulton's paddlewheel steamer Clermont, to the Ironclad USS Monitor, to the first nuclear-powered ship USS Nautilus, to roll-on roll-off cargo ships and Great Lakes ore carriers.

The sea has been an often-present force in our arts and letters - in Herman Melville and Richard Henry Dana; in Winslow Homer, Jack London, James Michener and James Clavell.

Yet in the history of our Republic, the idea of a national focus on marine science and industry is quite new. Only since World War II has there been anything like a broad national discussion of the Nation's role in coasts and oceans.

In our pluralistic society, we have always - aside from military matters - hesitated to assign sole direction to the Federal Government. We have always looked to the states, to private industry, and to universities to assume or share leadership in great initiatives.

What apparently was the first oceans debate in our history was stimulated by a very curious request. In 1791 a Maryland surveyor named John Churchman, claiming that he had solved the age-old problem of finding longitude by the magnetic variation of the compass, asked Congress for a grant. He proposed an expedition to Baffin Bay to make magnetic experiments.

The outcome was no money for Mr. Churchman - but an intensive discussion of whether the Government could or should support science, whether the project was of value to commerce, and if so whether the Federal Government or the states should have responsibility for supporting it.

I am sure you recognize those issues.

Many of them were again debated 16 years later, when Congress established the Coast Survey, the Government's first scientific agency. In considering the wellsprings of ingenuity, it is interesting to note the source of that idea.

Maritime New England each year experienced untold numbers of shipwrecks on uncharted rocks and shoals - fishing vessels lost, cargo ships wrecked, many people drowned. But neither the Federal Government, nor a State government, nor even the industries involved, identified the need for a thorough survey of the coast.

Instead, it stemmed from the relatively arcane American Philosophical Society, a Philadelphia group that we remember chiefly be-

cause the very practical Benjamin Franklin was its moving spirit.

The Society urged the idea on the Congress because of the arrival in its midst of Ferdinand Rudolph Hassler, a trained Swiss scientist fully qualified to undertake the work.

The Congress had serious Constitutional doubts about whether Federal funds could be spent for a coast survey, and it was finally authorized under the commerce clause.

And when it was reauthorized some years later, the legislation made it clear that the survey was to be a temporary organization with one job - to carry out its survey and then disband. Perhaps that is the earliest example of sunset legislation.

Of course it didn't work, because the coast is not as simple as it seemed in that far-off time. Today every seashore storm, undermining cliffs or moving barrier islands, reminds us of the eternally changing nature of our coasts.

It was 30 years after the Coast Survey before another major oceans issue came up - the United States Exploring Expedition of 1838. This was the first oceans initiative that captured the public's imagination as well as causing controversy in the Government.

And it started out poorly, with long debates over how to justify it, and great bureaucratic inefficiency in planning. Not until Charles Wilkes was selected to head it did it become viable, and ultimately a triumph of American ocean science.

Interestingly enough, in addition to its scientific accomplishments, it produced large numbers of nautical charts of faraway places - some of which were actually used by the U.S. Navy in the battle of Tarawa in 1943!

The fact that the expedition was justified on the basis of science, rather than commerce,

is significant. Up until that time prevailing opinion held that the Federal Government could not constitutionally support science.

Then, for more than a century, there is no record of a major national focus on oceans or coasts. There are, however, two events that we should note in passing that have had a significant impact on our subsequent oceanic history.

Matthew Fontaine Maury, perhaps the most famous American scientist of his time, discovered and developed the vast potential of ships for making a continuous record of the winds, currents, and nature of the ocean. From the ready-made corps of observers that they provided, this great oceanographer created a world view of meteorology - an outstanding example of linkage among different scientific disciplines.

And, during the great conservation era of the 19th century, a U.S. Fish Commission was established to look into the disappearance of the resource along our coasts. It eventually became the National Marine Fisheries Service.

But not until the 1960's were there major public discussions on oceans and coastal policy, stimulated by two excellent reports:

- The National Academy of Sciences' historic Oceanography 1960-1970 set out recommendations for a decade of science, technology, education, and international cooperation.

- And in 1966 the President's Science Advisory Committee called for, in the words of its report title, Effective Use of the Sea.

During the same period of time public attention was focused on a series of international scientific efforts of which oceanography was an important part. They began with the International Geophysical year of 1957-59, which led to an explosion of knowledge about

the earth, atmosphere, and sea around us.

The International Indian Ocean Expedition followed, with oceanography as one of its major programs. For that event, you may remember, the Presidential yacht Williamsburg was converted to a U.S. research vessel and renamed the Anton Bruun after a famous Danish biological oceanographer.

Under the auspices of the World Meteorological Organization the U.S. participated in the Barbados Oceanographic and Meteorological Expedition, then the First GARP Global Expedition, which explored the linkages between the oceans and the climate.

The ferment of those years resulted, among other things, in the Stratton Commission report, Our Nation and the Sea, and the establishment of NOAA.

Today there is another ferment in ocean and coastal concerns.

Recall that in 1945 President Truman asserted U.S. jurisdiction over the resources of the continental shelf. In 1976 the Magnuson Fishery Conservation and Management Act established jurisdiction over fisheries within 200 nautical miles of our shore.

And on March 10, 1983, President Reagan proclaimed a U.S. Exclusive Economic Zone over all the resources out to the 200 nautical mile limit.

So, to celebrate the sea's contributions to our history, and to look toward our stewardship of its future as envisioned by President Reagan, we are observing the Year of the Ocean.

On March 8 of this year the President made formal recognition of the Year of the Ocean. As he said in his statement:

"This great saltwater resource reaches, directly or indirectly, into every American

life. Among other things, it provides fish for our tables, petroleum for heat and fuel, and waterways for transportation. It serves as our pathway to the rest of the world and as the medium for the majority of our foreign trade."

The Year is designed to expand public understanding of the ocean's importance, to promote a sense of stewardship among ocean organizations and industries, and to foster a public-private partnership for the wise management of ocean resources. Its activities are being coordinated by a non-profit Year of the Ocean Foundation.

It began July 1, though some events were under way as early as March 10, the anniversary of the proclamation of the Exclusive Economic Zone.

While many of the plans are subject to availability of funds - and the foundation is engaged in a fund-raising effort - they call for a variety of activities.

Some events are simple celebration. You have perhaps seen the Year of the Ocean posters available from the Foundation. Others have been created for the Year by universities and organizations around the nation, such as the Texas A&M University Sea Grant program.

Other events are educational. The Foundation is planning ocean round tables, which will have the Chief Executive Officers and other high level officials of industry and public organizations discussing topics important to ocean industry.

Symposia are also planned for both small and large audiences. They are intended as neutral discussions that will focus on the multiple uses of the ocean.

Topics tentatively include the effects of the ocean on world climate - El Niño, for

example - the importance of marine transportation to world commerce, and the protection and management of living marine resources.

I am sure that many of your organizations have projects of this nature under consideration for their contributions to the Year. If not, perhaps you should make some suggestions to your bosses!

The Foundation's Educational Committee has prepared participation kits that are being sent to schools and other organizations and individuals who may wish to arrange events in connection with the Year. The kit includes a poster with information on the back, an events calendar, logos and a list of promotional items.

The calendar lists such events as port visits by research vessels and tall ships, conferences with a Year of the Ocean theme, symposia, and festivals.

There is also an Economic Research and Forecast Committee that will be dealing with economic issues such as the proportion of the Gross National Product that derives from ocean industries. In addition, they will make an effort to measure and analyze the contributions of these industries, to try to find the most promising growth areas to explore.

One of the services the Foundation hopes to provide is a comprehensive printed list of all oceans organizations - a badly-needed publication. However, the Foundation is already providing the information to users electronically.

In sum, the Year is designed to bring together people at all levels to work together, plan events, grapple with issues vital to them and share perspectives and recommend solutions to problems.

I invite all of you, as individuals, to

join in, to contribute your expertise and talents to the public discussion, and to help the Year reaffirm for Americans the need for wise stewardship of our great oceanic resource.

It is especially fitting that Year of the Ocean events began on the anniversary of the proclamation of the Exclusive Economic Zone. Establishment of the Zone opens up great possiblities for our country - ultimately for economic development, more immediately for the scientific exploration and technological planning on which development is based.

I want to go over with you some of the work under way and planned that will help our Nation take advantage of the possibilities both of the Exclusive Economic Zone and of international waters beyond it.

First, I'll tell you about the project to map the Zone, so that we can know exactly what is there and where it is.

Then I'll mention some of the possibilities for ocean minerals - both polymetallic sulfides and manganese nodules.

And finally I'll talk about ocean thermal energy - getting electricity from seawater.

To build on our basic knowlege of the area included in the Zone, and prepare for the development that will come when economic conditions are ripe and a regulatory regime is in place, NOAA and the U.S. Geological Survey are undertaking a major program to map the EEZ, using the NOAA ships Surveyor and Davidson. The first area to be mapped is the outermost continental shelf, the continental slope, and the upper rise off the coast of California.

The west coast will take about three years, and the Alaskan area will be started in 1986.

In 1987, the ships will begin to alternate between the Hawaiian archipelago in the winter

and Alaska in the summer. This will coincide nicely with the availability of the satellite-based Global Positioning System, which will start up in Hawaii the same year. It will enable the ships to know exactly where they are at all times, without the need for establishing numerous temporary shore stations for reference.

This is truly an interagency and interdisciplinary effort, designed to take full advantage of the possibilities opened up by the President's statement.

In addition, NOAA hopes to focus on the physical, chemical, and biological aspects of those parts of the ocean.

For the mapping, we have two excellent seagoing systems for high resolution multibeam swath surveys, and we are working closely with the Geological Survey and other interested parties in planning joint use of them.

The Seabeam system, on the Surveyor, is a deep water system. It is used in water depths greater than 100 meters, and has a swath width of 80 percent of the water depth - in other words, in 1000 meters of water its photographs would cover a strip of the ocean bottom 800 meters wide. It can be used in waters up to 3500 meters in depth.

The other system, known as BS³ - Bathymetric Swath Survey System - is on the Davidson, and is used in shallower water. Its swath width is much larger - 250 percent of the water depth. It is an excellent, and unique system.

The Davidson will cover waters from 150 to 600 meters deep. In the zone of roughly 400 to 600 meters, where the two survey techniques overlap, the Davidson's system is more efficient, and in general is the one that will be used.

The surveys have started near Cape Mendo-

cino and will work southward to Point Conception.

Our National Geophysical Data Center is working closely with the Geological Survey on a plan for distributing the bathymetric data obtained from these cruises.

Oceanic deposits of polymetallic sulfides are among important recent discoveries of science that hold great promise for development. The most extensively studied hydrothermal field is in 2500 meters of water along the marginal fault system of the Galapagos Rift Valley, where French and American scientists have made detailed studies of its geology, fauna, and water chemistry. Only as recently as August 1981, was it mapped.

While NOAA scientists were doing this, a joint U.S. Geological Survey-University of Washington expedition produced dredged samples from another massive deposit in the rift valley of the Juan de Fuca Ridge off the coast of Oregon.

A year later, the first such deposits were also discovered in the Atlantic Ocean, on a slow-spreading ocean ridge 1300 miles east of Miami.

Such developments as deep tow techniques, ocean floor saturation photography, and the use of manned submersibles - in particular, the Alvin from Woods Hole - made possible much of the discovery and mapping that has taken place.

Another recent discovery in the Pacific basin is the existence of cobalt-rich crusts on sea mounts. Again, this is a fascinating scientific find that has a high potential for development when the time is ripe. The Geological Survey's research vessel Lee is making a circum-Pacific cruise that among other things is looking into these crusts.

The earliest possibility for deep seabed mining - manganese nodules - has reached a rather more advanced stage.

Commercial nodule mining is unlikely to take place in the near future, of course, because of the state of the world economy and the additional costs of working at sea. But a company may need to demonstrate the ability to obtain a permit for deep seabed mining in order to arrange the necessary financing for the capital improvements that may be required.

We want to have the legal and regulatory regime in place and ready when the economic and political time is ripe. To this end, we've met our schedule and have proposed regulations to the Office of Management and Budget.

Seven other nations are also interested in pursuing this, and we have negotiated with them on agreements to coordinate the programs and to develop a broadly based international legal regime.

Of the seven, the United Kingdom, West Germany, France, Italy, and Japan now have legislation similar to ours. We are also negotiating with The Netherlands and Belgium.

There are some areas of technological development today where the basic research was done long ago, and economic payoff is much closer. One of them is ocean thermal energy conversion - using the difference between warm surface water and cold deep water to produce electricity.

We are by no means the only nation in the world interested in getting this technology on line - France is planning such a plant for Tahiti; The Netherlands and Indonesia are funding a project in Bali; and Japan and Sweden are involved in OTEC (Ocean Thermal Energy Conversion) programs of their own.

Within the United States, the Department of Energy (DOE) has the lead in sponsoring OTEC development. NOAA is undertaking the ocean engineering research activities of the DOE program.

In April of this year we installed a fully instrumented pipe section in the water off the National Energy Laboratory of Hawaii, for a year-long test of the pipe's strength and durability, problems with biofouling, and other factors.

Ocean thermal energy conversion is, of course, most likely to be cost effective in locations such as islands with steep slopes and deep water close by - where the cold water-warm water differential is readily available near shore. This enables shore-based OTEC systems with extended cold water pipes to draw both warm and cold water quite readily.

Ocean thermal energy is also desirable from a socioeconomic viewpoint. It is infinitely renewable, and if done properly has little or no effect on the environment. It is basically non-polluting.

It can be on-line 24 hours a day with no requirement for additional storage capacity, so it is acceptable as a power baseload option.

The cost and high risk of preliminary planning, testing, and design of such a radically new kind of power source, however, are far beyond the risk-taking capability of the private power industry. The role of the Government therefore has been to undertake the feasibility studies, and do some of the basic design and testing.

Under DOE leadership, we are helping to develop the technology to the point where private industry can take over when the economic situation justifies the investment.

Designers thinking about the physical attributes of sites where an OTEC plant might be feasible came up with two basic plant locations - one on a shelf-mounted platform near shore, comparable to oil-drilling platforms, and the other on land.

Initially the first option seemed most desirable, and it was pursued with considerable ingenuity. Both the Government and private industry contributed to the design and in some cases construction of model floating power plants with long uptake and outflow pipes suspended below them. There was a lot of engineering knowledge already available for this kind of arrangement from the designs of offshore oil rigs.

The OTEC platforms would house the heat exchangers, turbines, generators, and other heavy equipment of the plant, and transmit the power to shore by a variety of methods.

More recently, closer attention has been paid to the onshore option. Building the necessary facilities on land would solve many problems of weight, size, and seakeeping ability that would confront designers of floating platforms.

A land-based power plant, however, would require installation of a pipe on a very steep slope underwater - a requirement for which there is very little design experience.

So NOAA has undertaken an engineering design experiment with shelf-mounted cold water pipe, to see how it behaves in a seaway. The section of one-third scale pipe is installed on a 45° slope at a depth of 70 to 130 feet. It is fully instrumented, with many channels of information from strain gauges, accelerometers, and other sensors. Its purpose is to validate the analytical models that have been developed.

We'll see how it works.

The DOE program to develop the technology to the point where the private sector can take over is not the whole story. NOAA has several other interests in OTEC.

One of the most important is licensing. As Congress recognized when it passed the Ocean Thermal Energy Conversion Act in 1980, a clear regulatory framework would be needed to permit and encourage the development of a commercial OTEC industry in the United States.

Without it, the legal barriers and uncertainties were sufficient to discourage U.S. companies from building and operating OTEC plants.

The Act calls for establishing a fair and expeditious licensing system to ensure that U.S. facilities comply with both U.S. and international law. Under a NOAA license, operators will be granted a new element of site security. It is intended that a single decision, representing all Federal agencies, be made without the protracted delays that sometimes occur in other governmental licensing processes; and NOAA has the responsibility for administering the system.

NOAA established procedures as early as 1981 for application for OTEC licensing - and prompt processing of the applications - and published them in the Federal Register.

Reflecting the Act's requirements, the regulations ensure that application to NOAA constitutes application for all necessary Federal agency actions except Coast Guard inspections and approvals. They provide that all appropriate Federal and State agencies receive copies of the application in timely manner, and that public involvement is insured.

NOAA is reviewing the application requirements in these regulations to see if they can

be made clearer and more efficient.

While no formal application for an OTEC license has yet been filed, we have had pre-application consultations with four companies - two interested in plants in Hawaii, one in Guam, and one in St. Croix in the U.S. Virgin Islands.

Our third kind of interest in OTEC is its possible impact on fisheries. This primarily relates to the possible entrainment of organisms resulting from pumping large volumes of seawater through an OTEC plant and from discharge of OTEC water, and the use of biocides. We're also concerned about the redistribution of nutrients and trace metals.

There is already a lot of information available to help with a preliminary assessment of potential effects. We have begun to synthesize it, and should be through with the analysis this year. At this point, we don't believe the potential risk that OTEC operations will cause to fisheries is sufficient to cause us to stop its early development.

Because this is an unprecedented kind of operation, however, some level of uncertainty will remain until a pilot plant can be monitored over a period of time.

And that, I think, gives you the essential story of why we are celebrating a Year of the Ocean and developing an Exclusive Economic Zone. Both are embedded in America's magnificent marine history, and both are designed to help enhance our nation's future through its marine potential.

I hope you will join us in the Year of the Ocean. Thank you.

NOAA'S ROLE IN USER COMMUNICATIONS
A NEW OUTLOOK

William Stanley, Deputy Chief
NOAA External Affairs Staff

One of the central problems facing the Reagan Administation is how to improve the communication link between the Federal Departments and their user community. NOAA has begun a program in external relations that directs management interest toward improving user relations, i.e., determining product effectiveness, available services, user needs. One of the principal programs in improving product application is Port Objectives for Real Time Systems (PORTS). User seminars and meetings have been held in many of the major port cities of the United States seeking user comment and input to this advanced systems application. The opening last fall of NOAA's first Ocean Service Center in Seattle, Washington, is a prototype of a new approach in user communication providing access to NOAA's vast data banks.

It is with a great deal of pleasure that I once again have the opportunity to speak to you... and particularly with this being the Tenth Anniversary of your organization. As you may know NOAA has placed a high priority on user outreach and on improving its service delivery systems.

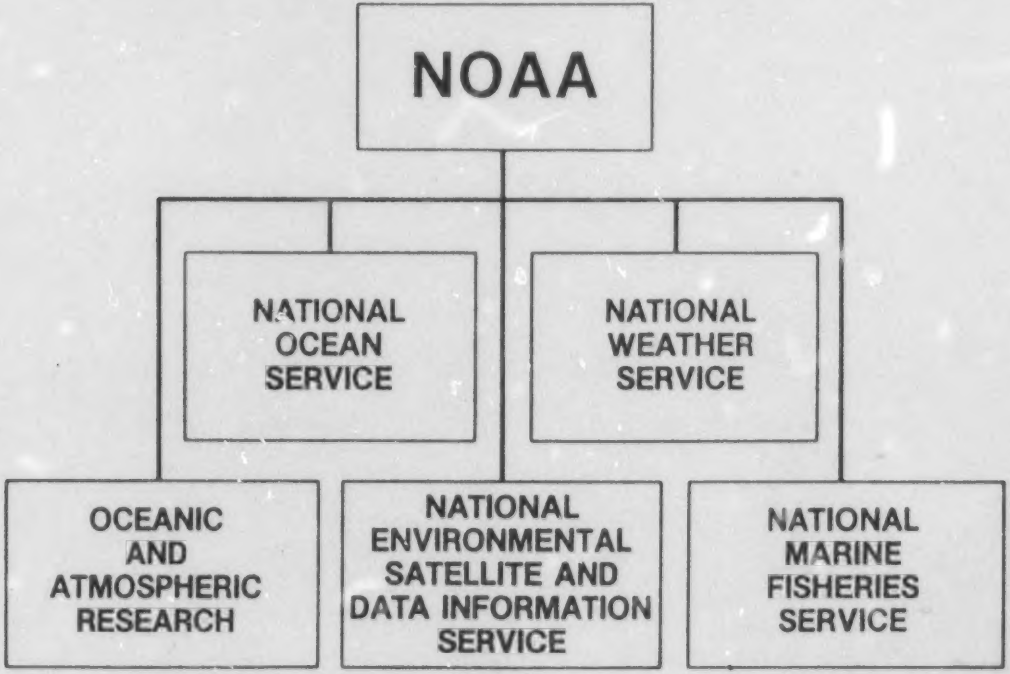
1983 marked the beginning of a new direction for user service in NOAA. After nearly a year of intense management review, Dr. Byrne announced in December 1982 a new organizational structure for NOAA that recognized the need both to improve external relations with the NOAA user community and to increase the visibility of ocean data.

This new structure was highlighted with the creation of several new offices. External relations staffs were established for the Na-

tional Environmental Satellite, Data and Information Service (NESDIS) and for the National Ocean Service (NOS). These two external relations groups have been charged with the task of seeking ways to improve all aspects of user communications; to exploit established technical programs; to see if new methods could be employed to increase the understanding of the programs and the users' needs in relationship to the service provided; and to broaden program visibility to scientific and technical audiences through improved delivery systems, through technical conferences, special events, printed media, and public awareness programs. New relationships are emerging for NOAA's potential user constituency groups. A series of user conferences have been conducted to bring together those in the user community with specialized interests such as the fishing industry, ocean data systems, and marine commerce. The first of these conferences was held in Seattle, Washington, a year ago. The success of that event has lead to a second conference scheduled for late November in Anchorage, Alaska, and another is tentatively scheduled for mid-October 1985 in New Orleans.

The National Ocean Service External Relation Division is located in the Office of Ocean Services, one of five line offices of NOS, and is comprised of three primary elements. The first of these is responsible for developing events, conferences, and other forms of outreach to link users and special interest groups to NOS/NOAA programs. Publications and other forms of printed material are carefully developed to draw attention to NOAA's outreach efforts. The second element of the Division focuses on marketing as the principal vehicle for NOS product evaluation and coordi-

NOAA ORGANIZATIONAL CHART



nation of marketing studies for targeted product groups. The third element of NOS External Relations Division is directed toward international relations providing for coordination and conduct of international affairs which furthers NOS/NOAA and U.S. goals and objectives. Through careful interaction and coordination with other line offices of NOAA the international affairs of NOAA provide a unique opportunity to window scientific exchanges and improve international relations.

One of the primary goals of the External Relations Offices is to enhance the marketing of NOAA products and services. This effort has been a major initiative for the NOS External Affairs group. Since early 1984, NOS has conducted several marketing surveys to determine the actual need of its users in navigational marine data. The results of these surveys have brought about the design and marketing strategy for future products and services to insure that we are providing what the user wants.

In response to the Stevenson-Wydler Technology Innovation Act of 1980, every Federal agency engaged in R&D has established an Office of Research and Technology Applications (ORTA). NOAA's ORTA is housed in NESDIS to collect and disseminate information on the results of NOAA R&D activities that may provide solutions to state and local government problems or have application in the private sector. ORTA also facilitates direct contact between NOAA scientists and engineers and potential users of NOAA developed technology. ORTA's data dissemination is accomplished through Tech Notes, which is a series of monthly publications of the Center for Utilization of Federal Technology. Information is also distributed by the Marine Advisory

Service and the Federal Laboratory Consortium.

One of the central management problems recognized by the Reagan Administration is how to improve the communication link between the Federal Departments and the public need for service that is timely and accurate. NOAA has taken a major step toward improving delivery systems and timeliness of the information provided. One of the principal programs begun in ocean data to improve product application is Project P.O.R.T.S. which stands for Port Objectives for Real-Time Systems. Basically, what this means is that a system would be developed to provide real-time navigational data to the pilot of an ocean tanker navigating in port areas of the United States or perhaps a small boat owner or fisherman as he navigates in the intracoastal waterway system. A series of seminars and meetings have been held in many of the major port cities of the United States, seeking user comment for this advanced systems application.

The technology applied to this new system provides for telemetering of data for tidal, water currents, winds, waves, and atmospheric conditions to be sent directly to onboard-ship computers giving visual display (with the help of a CRT) of the data requested by the user. Incorporating both satellite and land stations with remote telemetering from gages and other forms of sensors strategically located in coastal and estuarine areas, the user will have direct access to NOAA's data systems.

This effort, being developed by the NOS Office of Marine Assessments, is but one of many exciting new ocean data systems that have placed NOAA in the vanguard of the Federal scientific efforts to improve user outreach.

One of the most significant user outreach efforts ever undertaken by NOAA is its Ocean

Service Center Program. This initiative to improve NOAA's services and delivery of services to the public has been spearheaded by Dr. Byrne to bring about a new awareness of NOAA services available to the public and to the specialized user groups. The first of these new centers opened in Seattle, Washington, in 1983. The center will coordinate and consolidate existing NOAA products and services, structuring them in such a way as to insure better communication delivery, and improved service on a regional basis. Careful consideration is being given to determine the types of users, their needs and special requirements on a regional basis. Each program element of NOAA will be represented at the center. The center will provide a one-stop service, with representatives from each of NOAA's components available on-site to offer expertise, information and above all personal support to ocean data users. The center will enable users to obtain information on ocean conditions, marine fisheries, ice conditions, marine mammals, sea ice locations, and marine weather forecasts. On-line data available will include current observations, satellite, and forecast information. Products include regional forecast services, navigational information, fisheries educational data, data referral, and NOAA publications. Offshore products prepared regionally will include marine weather warnings, winds, waves, tidal current predictions, sea surface data, mixed-layer depths, key isotherms, and specialized data on a real-time basis. We view the centers as opportunity to develop an ongoing dialogue with the marine community, as a major step in the program for community outreach, and improved interaction with our users, whether it be user group meetings, special product descrip-

tions, or bulletins on special topics. The Seattle Center was followed this past July with the opening of the Anchorage Ocean Service Center. Similar centers are projected for the northeast, mid-Atlantic, southeast, gulf and western regions.

The outreach program of NOAA has several other elements to its structure. The NOAA Extension Program was established as a staff office to the Administrator to coordinate and manage user information, with practical education and technological transfer, in the marine and atmospheric sciences. The program will build on already established extension-type projects monitored by NOAA's Sea Grant program and other related activities; by providing leadership, coordination, and focus so that NOAA can achieve a clear and coordinated extension effort throughout the many programs and organizational entities involved in NOAA user services. The Extension Program will concentrate on information to small businesses, state and local governments, and the general public. The program will identify areas in the business community where we are competing unfairly with the private sector. Other initiatives taken to open lines of communication with user groups include NOAA's Industrial Research Associate Program announced at the opening ceremonies of the Seattle Ocean Service Center. This program was developed to strengthen the ties between the Nation's private and federal sectors through joint efforts in research and engineering.

The Industrial Research Associate Program will give scientists and engineers from private firms an opportunity to work with NOAA scientists and engineers in such areas as the atmospheric sciences, hydrology, oceanography, space sciences, and fishing sciences. There are

also opportunities in geodesy, cartography, computer sciences, instrumentation, and communications. The program is monitored by the National Weather Service's (NWS) External Relations Office which acts in a similar capacity as the NESDIS and NOS external relations programs. With NWS, the Program seeks to establish and improve two-way communications with external users of NWS hydrometeorological products and services. External users include a wide variety of organizations, both private sector and governmental. Some of these are consulting meteorological firms, firms supplying weather forecasts and other data, airlines, shipping companies, utilities, construction companies, universities, radio and TV stations, local and state government agencies, and various offices and agencies of the Federal Government. Products and services encompassed by this program include raw and processed meteorological and hydrologic data; basic analysis and prognoses; meteorological and hydrologic forecasts and warnings including watches and warnings of floods, hurricanes, tornadoes and other severe weather phenomena; and other weather information for specialized users. NWS also has a Community Preparedness Program which is involved in seeking ways to save lives and mitigate the social and economic impacts of natural disasters such as tornadoes, floods, and hurricanes. To accomplish the objectives of this program, NWS headquarters and field offices regularly hold two-way communications between civil defense and emergency service agencies, amateur radio, REACT and other organized spotter groups, public and private schools, and private companies. NOAA services under this program include communication with the general public by local NWS officials through interviews with the media

and attendance at public meetings and events. The Port Meteorological Officer (PMO) Program of NWS maintains a liaison between the captains and mates aboard ship, the NOAA/NWS marine groups, and the U.S. Coast Guard. The PMO's provide on-site training; collect comments, suggestions, and complaints from the mariners; distribute NWS Marine Observation Program (MOP) materials; and act as the NWS/MOP field representatives. The program develops and prepares handbooks, observation forms, instruments, and training material for coastal and ship weather observers.

The last of the new organizational elements I would like to discuss is the Office of Business Affairs.

As a staff office of the Administrator, the Office is responsible for focusing on NOAA's linkage to the business community. The Office will strengthen and improve existing relationships and initiate and cultivate new associations between NOAA and the business community. The goal of the Office will be to enhance the country's economic growth in those areas in which NOAA has a presence, such as the oceans, the atmosphere, and satellite technology. The Office advises the Administrator on specific NOAA issues and/or problems affecting the business community in order to develop useful dialogues, and represents the Administrator and NOAA before business groups, serving as the official conduit for the Administrator's position on issues affecting the business community. The Office reviews NOAA's programs in order to identify those areas in which the business community can effectively participate and contribute to the successful accomplishment of NOAA's mission.

The new Office will develop and promote a cooperative working relationship and assure

effective communication between NOAA and the business community. Key objectives of the Office include keeping the business community aware of NOAA and Administration policies and programs; insuring that NOAA officials are aware of interests of the business community and issues of concern to business; promoting business involvement in NOAA policy making and program development; and serving as a focal point within the Office of the Administrator for all NOAA elements in contact with the business community. The primary objectives of this new Office in the coming year will be to coordinate roundtables, briefings and seminars that bring industry executives together with the NOAA Administrator and other senior NOAA officials; and to assist the business community to reach the right person for answers to questions related to any part of the NOAA organization.

NOAA commitment to user outreach and the improved link the commitment brings to our users will undoubtedly lead to improved products and services to the American public, scientific community, and industry. As librarians and information center officials, we ask you to join us in a renewed commitment to improve service to the ocean community.

THE LIBRARIAN AS RECORDS MANAGER: DIVERSIFICATION IN THE LIBRARY WORKPLACE

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Although the vocabulary of Records Management may differ from that used in the library, the concepts and methods of both sectors of an organization are basically the same. If the library is to keep pace with modern management innovations, librarians must give consideration to making the library a multifaceted information facility: this will have far reaching implications for the traditional library functions.

Records management represents an opportunity that is within the librarian's range of knowledge and expertise. Classification and retrieval of files are allied to the information handling of cataloguing and reference in a close affinity to methodical collection weeding and rare book selection in the traditional library scenario.

Librarians are capable of handling a diversity of responsibilities. As part of their mandate, librarians manage personnel, including interviewing and training. They plan and project budgets and administer financial allotments accordingly. They are responsible for public relations in the library, having contacts with national and international agencies in the course of providing information. They acquire materials for the library, not just books and periodicals, but also stationery supplies, microform readers, CRT's, videotapes, slides and audio-visual equipment. In an age of specialization, the librarian is a universal specialist. And yet, apply for a prominent administrative position! The reaction - "But, you're a librarian!"

This unfavorable stereotyping of librarians

is a genuine hindrance to advancement in any area, and it is difficult to overcome. The reason why we have such a poor image fascinates me. In ancient times, the librarian was a respected scholar - a learned man who was a "keeper of knowledge". At the end of the eighteenth century a number of events contributed to the transformation of the librarian scholar into a less revered figure; the evolution of the popular press, the increase of literacy, mass papermaking and printing techniques and - alas - the proliferation of women workers, all played a part in the evolution of librarians "as others see us". You will be happy to know that there is, however, one occupation with an even duller image, and that is the profession of an accountant. Pauline Wilson in her book Stereotype and Status: Librarians in the United States writes that "...the accountant is the antihero of the occupational world. He is low in status, not well-to-do, and unsuccessful. He has little power in public affairs, not much opportunity for advancement, and his job is lowest of all the occupations studied in providing personal satisfaction. He is a conformist, with a minimum of social skills, limited intelligence, and inadequate personal and aesthetic sensibilities. He is rated as passive, weak, soft, shallow, cold, submissive, unsure of himself, and evasive in meeting life. His positive characteristics of caution, stability, conservatism and calmness rest upon a shaky emotional interior."[1]

Librarians do not have a favorable image either, and administrators seem reluctant to look beyond this unfavorable stereotype at abilities. The way out of this dilemma is to seize any opportunity that presents itself. Be ready to diversify if you are given the

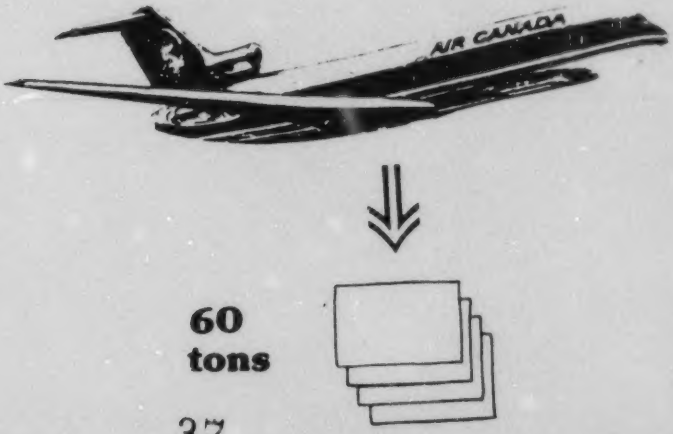
chance and accept the challenge of new ground! There are many areas peripheral to the library, especially in the information field, that are applicable to library experience - information management, computer applications, systems analysis, and PR jobs. Wherever the basic commodity is information we can make ourselves comfortable and productive.

My opportunity for diversification came when I was given a chance to manage a Central Records Office as part of my administrative responsibilities. My first reaction was "what goes on there?" "What are Records?" My acquaintance with records and files was limited to Corcoran's Law of Packrattery which states that "all files, papers, memos, etc. that you save will never be needed until such time as they are disposed of, when they will become essential and indispensible."[2]

Most people think that Records Management involves mail and correspondence only. A more detailed look at Records shows that the area and the concept are broad in scope and far-reaching in their implications. The Federal Government of Canada defines Records as "any physical medium containing and capable of preserving information in the form of written words, numbers, symbols, images and sounds. Records include the original and any copy of correspondence, memoranda, forms, directives, reports, drawings, diagrams, cartographic and architectural items, pictorial and graphic works, photographs, films, microforms, sound recordings, video-tapes, -disks and -cassetes, punched, magnetic and other disks and drums, holographs, optic sense sheets, working papers and any other documentary material, regardless of physical form and characteristics".

Problems associated with the proliferation

of records have been with us for some time. Ira Penn, writing in a recent article about Records management in the U.S. Federal Government describes the trials and tribulations of Records in 1780: "as the Government was moved its records were moved also. Often these records were kept in boxes and trunks - in attics and basements. The movement, the constant use, and the inadequate storage in places that were too hot, too cold, or too wet, resulted in loss or damage to many Federal documents."[3] This does not sound unlike similar situations prevalent today. And yet, how can this be allowed to happen? The reason is simple but devastating. The paper whirlwind of modern business is out of control. "One twenty-ton aircraft generates 60 tons of paper from the beginning of its manufacture to the end of its operating life."[4] The only solution to the paper overflow is the strict organization of records - not to stem the flow (that is another problem) but to store and access information in existing files.



Records management procedures are designed to do just that - to store, access and discard files in an orderly, planned and systematic fashion. The components of Records in the Federal Government of Canada involve mail distribution and dispatch, courier services, telecommunication facilities, classification of records, routing of correspondence, filing, scheduling, and disposal or archiving. Each of these facets of Records was a learning experience for me and required the acquisition of new expertise. Mail despatch necessitated my inquiry into the details of the postal service. Mail distribution internally occasioned time-motion studies, traffic and use pattern determination, as well as a systems analysis approach to mail procedures. Telecommunication facilities are essential for rapid exchange of information (especially by telefacsimile) and an administrator must have some grasp of the technologies in order to determine compatibility between machines, and upgrading demands to keep current, and ensure standardization across the country.

The heart of the Records operation is paper in various forms - controlling this paper in an orderly way occupies the time of most of the staff in a Central Registry. Incoming correspondence is opened, logged in, classified according to a subject file classification system placed on a file folder with like material, signed out to the addressee and routed through the internal mail distribution service. Incoming correspondence, usually between 70 and 150 items a day, goes through this process in a maximum time span of 24 hours - with the target being same day routing and receipt of all incoming items. Copies of outgoing and internal correspondence are also classified and filed according to subject, although this

category of material takes second priority to incoming material.

Files must be recalled when required by another user or when held for an unreasonable period of time. Returned files are shelved on a regular basis and staff do housekeeping chores such as replacing torn folders and closing filled volumes. Records operations have a schedule for the disposition and disposal of files. Such a schedule divides the subject files into various categories which, according to law or departmental requirements, must be maintained as active for a predetermined period of time. In a properly run Records office, files are methodically examined in the context of this schedule, kept on active shelves, stored in a dormant holding area or destroyed. A well-written schedule removes guess-work and judgment calls from file disposition and makes standard handling of records possible throughout an entire department. In Canada, Bill C-118, was passed to give official guidance in matters of records scheduling and retention. By this act of Parliament, Records have been divided into seven categories with stipulated retention periods for each. The guidelines show that, for example, financial records must be kept for six years and short-term health or safety records need be kept for two years only. This kind of legislation enables business and government to justify a departure from the "never throw anything away" syndrome and makes feasible the physical accommodation, in a practical sense, of records material. Proper scheduling of records in accordance with such legislation also has a very important effect on information retention for historic purposes, enabling staff to separate the wheat from the chaff in an impartial, unbiased way. Thus, records deal-

ing with government policy, international treaties, and other matters of historical importance are sifted from the routine flood of documents, destined for archival preservation at the end of their active file life.

My sorties into Records management have proved to be challenging and thought-provoking. Studying a new application for information has enabled me to take a fresh look at library problems which had become jaded through over-analysis. Many old solutions to library problems were novel approaches to Records issues. The similarity between these two information areas was remarkable when compared on a task by task basis.

In both Records and the library, classification of information by subject categorization forms the basis of our access mechanisms. Records routes correspondence via internal mail delivery in much the same way as the library routes current journals and publishers catalogues to internal users. Records signs out files on request the same as a library circulates material, using a card file for control. (Oddly enough, the idea of having a card and pocket attached to each file and used as the control in a procedure parallel to book circulation is quite foreign to Records, although feasible.) One of the primary tools used in Records classification is an alphabetically arranged card file with subject annotations, cross-indexed by numerical digit, very similar in concept and use to the public catalogue subject approach in libraries. The daily, unending housekeeping chores of recall, overdues, shelving and repairs are endemic to both areas. Records staff answer telephone (and in person) requests for information, and, like their library reference counterparts feel honour bound to produce results, leaving no

RECORDS	LIBRARY
Classification	Classification
Routing	Routing
Sign-out	Circulation
Subject files	Public catalog (subject)
Filing	Shelving
Scheduling	Collection development
Disposal	Weeding
Storage/recall	Storage/paging
Requests for files	Reference
Statistics	Statistics

stone unturned in the quest. Of course, statistics are the bane of our existence, regardless of our station. Both Records and the library are no exception: we collect them to prove and disprove theories and trends, depending upon the occasion. Sir Josiah Stamp, who was a collector of inland revenue for Her Majesty in the late 1800's said, "The government [is] extremely fond of amassing great quantities of statistics. These are raised to the nth degree, the cube roots are extracted, and the results are arranged into elaborate and impressive displays. What must be kept ever in mind, however, is that in every case, the figures are first put down by a village watchman, and he puts down anything he damn well pleases".[2] Statistics are more often used in defense than in offense.

The only aspect of Records which does not have an analogy in library operations is the process of scheduling and disposal of files. Few pieces of information in a library are ephemeral in nature. Weeding of

collections, when done at all, is done in response to a space pinch and then it is carried out with reluctance. Book knowledge, even in our scientific fields, has a capricious quality. If a book is new it is "current," then it goes through an indefinite period of time when it is non-current or out-of-date; then it attains an aura of being historic or archival. The value of book information is difficult to quantify in the same terms as Records information. However, I suspect this is a failure of librarians to address the problem of book obsolescence, in a structured manner, instead of on an ad hoc basis.

The staff of both the Records and Library operations suffer from the same handicaps imposed by their users - people are under the illusion that librarians "stamp out books" and Records staff "open mail". Our duties and responsibilities are misunderstood or, more accurately, under-rated. The PR function of the administrator or manager, therefore, takes on a new importance and must serve to educate as well as illuminate.

Records offices, like libraries, have severe space problems. Microform is seen as the ideal solution to Records space problems and, teamed with microcomputer technology, is heralded as the modern, efficient way to cope with the paper deluge. The selling point of micrographics is compactness. The replacement of a three drawer filing cabinet with three microfilm cartridges is, indeed, a strong incentive but caution should be exercised. The legal status of microform copies for Records operations is still unclear. Originals are still necessary in most financial and legal situations, so revolutionizing your office by a complete change to microform is unwise. In addition to these legal ramifications, we must realize that Records of historical signifi-

cance will be kept in their original form through to the archival stage. In these cases, microform is useful only as a duplicate working device while the original Records must be maintained in an accessible, but perhaps low-cost area off-site. The values of microform as space-savers are clear but conversion of Records operations from hard copy to microform must be approached with caution.

Both microform conversion and automation have the same high-technology attraction for modern offices. Unfortunately, the technology is seen as the solution to many problems which may be more simply cleared up by an analysis of manual procedures and work habits. When you automate a chaotic Records operation, the result is automated chaos. Marshall McLuen maintained that "the medium is the message"; however, in the context of Records, the message (or the information) is of paramount importance while the means of access is secondary.

The office of the future is leading us irretrievably toward the automation of many Records related functions. High speed telecommunication devices are replacing traditional methods of correspondence. Indeed, electronic mail between CRT's or word processors makes it possible for a "written" communication to pass from the sender's finger-tips to the receiver's eyes without ever touching paper or being recorded in the usual sense. The implications of such technology for Records operations are devastating - many records being produced are not even recognized as records.

Our technologies are out-running our records methodologies. Once, a typewritten original and a carbon copy would suffice. Now, in seconds a photocopier can produce dozens of copies and, better still, a word processor

can produce a dozen originals in almost the same time. We need a fresh approach to Records to enable us to cope with these machines and their consequences. The new information Acts may give us the incentive we need to begin and the support we need to be effective. The Access to Information Act in Canada provides "a right of access to information with the principles that government information should be available to the public..."[5] Notice that the act covers "records" - not just published or unpublished information, but memos, drafts and all other correspondence as well. If government is to answer requests under this Act, and answer them fully in the spirit and letter of the law, efficient, speedy access to Records must be possible. A combination of the technologies with sound organizational structures is now called for to meet this requirement.

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4. Moulds, Harold. 1969. "Why no proper training for clerical staff?". Canadian Training Methods. May/June, p. 12-14.

5. Access to Information Act. 29-30-31. Elizabeth II. Canada.

DOCUMENT DELIVERY IN A SMALL MARINE INFORMATION CENTER

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"Document delivery" is the terminology commonly used to describe the procurement of publications which are needed to fill the information requests of an information center's users. Computerized databases have made it relatively easy to identify and verify needed documents. Consequently, online searching has created a greater demand for efficient document retrieval; that is, information acquisition methods that are low in cost, have a fast turn around time and provide exactly what was requested.

Small libraries have unique problems with information retrieval. Sometimes the librarian must work without all the basic, but costly, reference tools and access to OCLC, RLIN, or the National Union Catalog is often unavailable. Determining locations where the document is owned is a common problem.

This paper discusses traditional and modern techniques of document ordering, focusing on the acquisition of technical reports, obscure journal articles, patents, government documents, and foreign publications.

"Document delivery" is the terminology commonly used to describe the procurement of materials which are needed to fill the information needs of a library's users. It is a four part process - identification or verification of a needed citation, locating where it is available, transmitting the request and confirming its availability. Ideally, efficient document retrieval methods provide the needed material as quickly and inexpensively as possible.

Libraries today, regardless of their size or financial support, cannot be self-sufficient in their collections. At the same time that

tight budgets have decreased libraries' resources, the electronic age has enabled the researcher to gather more bibliographic information on his subject of interest than ever before (Bayer & Jahoda, 1981). Online bibliographic information retrieval has increased the number of document/information requests because more relevant citations are located than would be possible using only printed indexes (Saboe, 1982).

VERIFICATION AND LOCATION

Small research libraries have unique problems with some aspects of the document/information retrieval procedure. Many small information centers provide online search services to their patrons, making it easy to identify the needed literature. Identification and verification of a citation are easy when online searching is available, somewhat more difficult when it is not or where the library's collection of printed indexes is limited. Citations for monographs are generally more straightforward than those for serials, where expanding the abbreviated journal title to its full name is essential. The most useful publications I have found for this purpose include:

SERIAL SOURCES FOR THE BIOSIS DATA BASE. 1983. Philadelphia, PA, Biosciences Information Service, c1984.

PERIODICAL TITLE ABBREVIATIONS: BY ABBREVIATION (Volume 1)
PERIODICAL TITLE ABBREVIATIONS: BY TITLE (Volume 2). 4th edition. Edited by Leland G. Alkire, Jr. Detroit, Michigan, Gale Research Company, c1983.

PIE: PUBLICATIONS INDEXED FOR ENGINEERING.

New York, Engineering Information, Inc., c1982. 84pp.

WORLD LIST OF SCIENTIFIC PERIODICALS. 1900-1960. 4th edition. 3 volumes. London, Butterworths, c 1963.

Determining the location where the material is owned is the most difficult part of the document delivery process for the small library. It must often be accomplished without access to computer networks such as OCLC (Online Computer Library Center, Inc.) or RLIN (Research Libraries Information Network, formerly BALLOTS) or basic printed tools such as the National Union Catalog or CASSI (Chemical Abstracts Service Source Index). Knowledge of the holdings of other libraries is essential to the success of interlibrary loan service. To determine the closest possible location I begin with the Florida Union List of Serials (microfiche), Florida COMCAT (microfiche - books by title) and the computer printout of the holdings of the Rosenstiel School of Marine & Atmospheric Sciences, University of Miami. Failing to locate the publication within the state I use the Union List of Serials (H.W. Wilson, 1965, 5 volumes); New Serial Titles 1971-1975 (Library of Congress, 1976, 2 volumes); New Serial Titles 1976-1980 (Library of Congress, 1981, 2 volumes). Serials lists from individual libraries are invaluable, particularly the microfiche listing from the University of California, San Diego, which includes the holdings of Scripps Institution of Oceanography, nd the hard copy of serials held by the Marine Biological Laboratory and Woods Hole Oceanographic Institution. Individual listings are extremely useful for libraries whose budgets preclude the purchase of the multi-volumed

Union Lists, which have a combined cost of over $800.

TRANSMITTING THE REQUEST

I use four basic methods for placing document orders - interlibrary loans, online ordering from a database-specific supplier, online ordering from an information broker, and contacting the author directly.

Interlibrary Loan

The standard method of requesting an item from another library has been to submit a typed A.L.A. form via U.S. mail. This method, though widely used, has many drawbacks - the main one being satisfaction time; that is, the time between the placement of the request by the library patron and the time that he has the document in hand. The inability to confirm availability is another major problem. It can often take weeks for a borrowing library to receive a rejected request form. Instant confirmation of an interlibrary loan request can best be obtained by telephone, though I prefer to reserve this method for emergencies. In order to locate addresses, telephone numbers, collection descriptions and contact persons, the following are essential reference tools in the small marine research library:

DIRECTORY OF MARINE SCIENCES LIBRARIES AND INFORMATION CENTERS. Compiled by Carolyn P. Winn. Woods Hole, MA, Woods Hole Oceanographic Institution and the International Association of Marine Science Libraries and Information Centers, 1981. (with 1984 supplement).

AMERICAN LIBRARY DIRECTORY. 2 volumes.

Edited by Jacques Cattell Press. New York, R.R. Bowker. Published annually.

The bulk of my loan requests are filled by libraries in the state university system of Florida, Scripps Institution of Oceanography (UCSD), and Marine Biological Laboratory/Woods Hole Oceanographic Institution. However, I have also had excellent service from the following, who have extensive holdings in science and technology:

Library
ACADEMY OF NATURAL SCIENCES
19th at the Parkway
Philadelphia, PA 19103

Library
NATIONAL MUSEUM OF NATURAL HISTORY
SMITHSONIAN INSTITUTION
Washington, D.C. 20560

Information Exchange Center
PRICE GILBERT MEMORIAL LIBRARY
GEORGIA INSTITUTE OF TECHNOLOGY
Atlanta, GA 30332

Interlibrary Loan Department
Room 28
UNIVERSITY OF ILLINOIS - URBANA/CHAMPAIGN
1408 West Gregory Drive
Urbana, IL 61801

The OCLC ILL Subsystem

Unavailable to many small independent information centers due to cost, the OCLC interlibrary loan subsystem appears to be the most efficient way to transmit requests and provide fast service to your patrons. The strengths of OCLC include the size and comprehensiveness of its database, its elementary procedures for searching and its large

membership. Access is provided to over ten million bibliographic records and 151 million holdings locations (Boucher, 1984). The information in these records can be used for searching, verifying, and creating interlibrary loan requests. The subsystem forwards the ILL request to each potential lender until it is filled. The status of your request can be checked on by consulting the subsystem's electronic message file. When evaluating the cost of the OCLC ILL subsystem, one must consider all the costs involved in traditional methods of interlibrary loan - the cost of the printed forms, postage, the expense of repeating the procedure and the extremely slow service. It appears that the subsystem is more useful for requesting monographs than for serials. In 1982, 86% of the one million plus requests handled by the OCLC subsystem were monographs (Information Systems Consultants, Inc., 1983).

Online Ordering

Online ordering is a viable alternative to interlibrary loan. The information specialist can not only search for relevant citations online, but can also place orders with a variety of suppliers without ever leaving the terminal. The benefit of ordering documents online must be determined by each library. I have found that the cost per item is generally higher than when ordered through interlibrary loan. However, sometimes online ordering is the only way to procure a document or a fast turnaround time is more important than cost.

I am personally familiar with DIALOG DIALORDER which allows orders to be placed for any citation found in the DIALOG databases or for free text ordering within 200 char-

acters using the .ORDERITEM command. DIALORDER now has 69 document suppliers (as of June 1984) which are of three types - database specific, collection specific and full service information brokers. Database specific and collection specific suppliers most useful in the marine science library include:

CASDDS (Chemical Abstract Service Document Delivery Service)
2540 Olentangy River Road
P.O. Box 3012
Columbus, OH 43210
(614) 421-3600, x20331

Supplies most documents cited in CA Search (Dialog files 308, 309, 310, 311, 320) within the last ten years.
Photocopy or loan: $10.00 1-50 pages
$20.00 50+ pages
Turnaround time: 5 days (Colbert, 8(2), 1984)

NTIS (National Technical Information Service)
U.S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161
(703) 487-4660

Supplies only items listed in the NTIS database (Dialog file 6). NTIS is the primary source for domestic and foreign scientific and technical reports.
The cost varies dependent on the publications selected. Documents are shipped within 2-10 days, but are shipped Third or Fourth Class, USPS. Turnaround time is generally poor for this reason. A surcharge of $10.00 per item is charged for First Class delivery.

THE GENUINE ARTICLE (OATS)

(formerly OATS - Original Article Text Service)
Institute for Scientific Information
3501 Market Street
Philadelphia, PA 19104
(205) 386-0100
Telephone orders: (215) 386-4399

Supplies articles from the SCISEARCH database (Dialog files 34, 94, 87, 186).
Cost for articles from 1980-present, 10 pages or less:

$7.50 (U.S.A., Canada, Mexico)
$8.50 (All other locations, includes Air Mail Delivery)
$2.00 each additional ten pages

Turnaround time: 4-9 days (Colbert, 8(2), 1984; Popovich, 1981)

BLLD (British Library Lending Division)
Boston Spa, Wetherby
West Yorkshire
LS23 7BQ
United Kingdom

Supplies database as well as non-database materials including books, serials, dissertations, conference proceedings and government publications.
Cost:

$4.50 per unit (a unit covers up to ten pages)
Booklets of 20 coupons - $90.00
Deposit accounts recommended

Turnaround time: Document is generally sent air mail within 48 hours.

My experience with full service information brokers has been almost exclusively with Information on Demand (IOD) Berkeley, California (INFO on DIALORDER). On occasion, I have tried other brokers out of curiosity but Information on Demand has always provided excellent service particularly when you con-

sider that most of the documents that I order from IOD are those that I have been unable to locate using conventional methods.

INFO (Information on Demand, Inc.)
2112 Berkeley Way
P.O. Box 9550
Berkeley, California 94709
(415) 644-4500
(800) 227-0750

Supplies journal articles, theses, government documents, conference papers, annual reports, patents, etc. They maintain staff at more than 15 academic, public and special libraries.

Cost: $14.00 per item, up to 20 pages (includes copyright royalties and First Class postage)
Rush service - $6.00

Turnaround time: 6 days plus (It has varied widely for me depending on the request. About one in ten is never filled although I have always been sent status reports concerning the methods used in locating the items).

Using an information broker limits the time I have to devote to finding a source. IOD is more likely to know which source has the greatest probability of successfully filling my request. Information brokers are sometimes unable to fill orders; generally because the citation is bad, the media format requested is unavailable or distribution of the document is limited.

Payment Methods

The method of payment can make a great deal of difference in overall turnaround time, though interlibrary loans are less affected

by this than online orders. Most libraries will provide a bill with the completed interlibrary loan request or shortly afterward, although some require prepayment (e.g., New York City Public Library, Library of Congress). The most advisable methods for handling payment of online orders are deposit accounts and coupon booklets. This way the order can go out immediately. To deal with those vendors that I use infrequently, where I don't have a deposit account or coupons, I send a cash purchase order (CPO). This provides a purchase order with an attached blank check that can be filled out by the vendor. At this time my CPO's allow for the purchase of any item up to $75.00.

Contacting the Author

Many librarians give up on a request after several rejections from other libraries, because "librarians tend to be 'other-library' oriented" (Colbert, 3(3), 1979). Often I have to locate papers where the citation is inaccurate or can't be verified, papers that were presented at a conference but never published, or papers that are still in press. I have found that dealing directly with the author is an excellent way to procure such documents. In addition, you may often get several related publications by the same person, simply because you are dealing directly with an author's ego. To locate an author I use the following, which provide complete information concerning author affiliation:

Online databases (Lockheed DIALOG)

AMERICAN MEN AND WOMEN OF SCIENCE
BIOSIS PREVIEWS
CA SEARCH

SCISEARCH

Printed directories

AMERICAN MEN AND WOMEN OF SCIENCE. 14th edition. New York, R.R. Bowker, c1979.

AMERICAN MEN AND WOMEN OF SCIENCE. EDITIONS 1-14 CUMULATIVE INDEX. New York, R.R. Bowker, c1983.

CURRENT BIBLIOGRAPHIC DIRECTORY OF THE ARTS AND SCIENCES. Philadelphia, PA, Institute for Scientific Information, published annually.

U.S. DIRECTORY OF MARINE SCIENTISTS 1982. Washington, D.C.. National Academy Press, c1982.

PROCUREMENT OF SPECIFIC TYPES OF DOCUMENTS

Associations' Publications

Publications of societies and associations are often needed in the marine research library. Many are cited in common online databases and printed indexes and often can be located in Union Lists. However, many are quite old or are simply obscure publications. Very helpful in identifying documents published by associations are:

ASSOCIATIONS' PUBLICATIONS IN PRINT, 1983. New York, R.R. Bowker, c1983.

SCIENTIFIC, ENGINEERING, & MEDICAL SOCIETIES IN PRINT, 1980-1981. By James M. Kyed and James M. Matarazzo. New York, R.R. Bowker, c1981.

If I'm unable to verify the publication, I use the ENCYCLOPEDIA OF ASSOCIATIONS

(18th edition. Detroit, Michigan, Gale Research, c1983) to ascertain the address of the organization, whereupon I contact them directly. The abovementioned title is also accessible online.

ACRONYMS, INITIALISMS AND ABBREVIATIONS (8th edition. Detroit, Michigan, c1982) can be very helpful in identifying the full name of the organization or association.

Standards and Patents

'Marine science library' may be a misnomer for many of our facilities, particularly those with active engineering departments. Our ocean engineering division often needs both national and foreign standards and patents.

United States and British Standards are available from the major domestic source for standards:

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1430 Broadway
New York, New York 10018
(212) 354-3300

> Prepayment is required and turnaround time is at least one month, generally longer. Prices vary.

British standards can also be obtained from the following U.S. libraries:

LOS ANGELES PUBLIC LIBRARY
Science and Technology
650 West Fifth Street
Los Angeles, CA 90071
(213) 626-7461

CARNEGIE LIBRARY OF PITTSBURGH
Scientific and Technology Department

4400 Forbes Avenue
Pittsburgh, PA 15213
(412) 622-3138

Orders for Canadian standards should be sent to:

CANADIAN STANDARDS
178 Rexdale Blvd.
Rexdale, Ontario M9W 1R3
Canada
(416) 744-4045

Prepayment is required.

U.S. patent information is easy to obtain online via the CLAIMS™/U.S. PATENTS databases. Copies of U.S. patents are available from a wide variety of sources. Due to very slow satisfaction time, the vendor I would least recommend is:

U.S. PATENT AND TRADEMARK OFFICE
Commissioner of Patents
Washington, D.C. 20231

This is the least expensive patent vendor that I have used, but the minimal savings don't justify the slow turnaround time. Cost is $.50 per patent. Order procedures can be simplified by purchasing coupon books.

Two companies providing fast turnaround time at a low price are:

PATENTS UNLIMITED
P.O. Box 2592
Arlington, Virginia 22202
(703) 521-8418

RAPID PATENT
2221 Jefferson Davis Highway
Arlington, VA 22202
(800) 336-5010

Orders for Canadian patents can be sent to:

COMMISSIONER OF PATENTS
Ottawa-Hull L1A 0E1
Canada

Provides copies of patents numbered 1 through 445,930.

MICROMEDIA LIMITED
165 Hotel de Ville
Hull, Quebec J8X 3X2
Canada

Provides copies of patents numbered 445,931 to date.

Dissertations and Theses

With few exceptions, University Microfilms International (UMI) Ann Arbor, Michigan, can furnish domestic dissertations. Some universities will loan or photocopy dissertations regardless of their availability from UMI. UMI offers very few foreign dissertations. Without access to the National Union Catalog or OCLC, I have found that the best source of domestic or foreign dissertations not available from UMI is the educational institution which granted the degree. An excellent reference tool detailing rules of availability is:

GUIDE TO THE AVAILABILITY OF THESES. Compiled by D.H. Borchardt and J.D. Thawley. Munchen; New York, K.G. Saur, c1981. Publication # 17, IFLA (International Federation of Library Associations and Institutions)

This book gives information concerning the name and address of the university, the name of the library, restrictions on borrowing and photocopying, availability on interlibrary loan, and other libraries

which usually receive copies.

Theses and dissertations from the United Kingdom are best ordered from the British Library Lending Division (BLLD). Loan requests sent directly to a university in the U.K. are generally returned with a recommendation to direct the request to the BLLD which provides loans, photocopies and microforms, depending on the restrictions on the document.

Canadian theses can be obtained in microfiche form from:

CANADIAN THESIS ON MICROFICHE
CANADIAN THESIS DIVISION
NATIONAL LIBRARY OF CANADA
395 Wellington Street
Ottawa, Canada K1A 0N4

Orders must be prepaid. Delivery time is 2-4 weeks (Colbert, 4(2), 1980)

Foreign Publications

Most articles in foreign serial titles are available from domestic sources via interlibrary loan or online ordering from commercial document suppliers. However, some journal articles and report literature must be ordered from foreign sources. Ordering the document from the original publisher is always my first choice. If this fails I attempt to secure a loan or photocopy from a major overseas library. I have had very good responses to my requests from most countries, moderate success with France and India, and no response whatsoever from Yugoslavia.

Papers from journals published in Australia and publications of the Commonwealth Scientific and Industrial Research Organization (CSIRO) can be requested from:

UNIVERSITY OF SYDNEY
FISHER LIBRARY
Interlibrary Loans Section
Sydney, 2006
Australia

Only photocopies are available, no loans.

Numerous documents on the marine environment are published in Canada. Two good sources for this literature are:

ENVIRONMENT CANADA
Publications Sections
Ottawa, Ontario K1A 1C8
Canada

CANADIAN INSTITUTE FOR SCIENTIFIC AND TECHNICAL INFORMATION (CISTI)
National Research Council
Bldg. M55, Montreal Road
Ottawa, Ontario K1A 0S2
Canada

Indian technical reports, conference proceedings and serials are generally available for purchase. If not, loans and photocopies can be ordered from:

NATIONAL SCIENCE LIBRARY (INSDOC)
Scientist
JNU Campus Club Building
New Mehauli Road
New Delhi 57
India

Russian titles are frequently requested domestically. One library with an extensive collection of scientific Soviet periodicals is:

BATTELLE MEMORIAL INSTITUTE
COLUMBUS LABORATORIES
Foreign Science Library
505 King Avenue

Columbus, Ohio 43201
(614) 424-7131

Another excellent source for Russian literature, as well as documents from the United Kingdom, is the British Lending Library Division (BLLD). The British document delivery system is quite possibly the finest in the world because they have concentrated on creating a single supply source. Materials are collected for the purpose of filling interlibrary loan requests. The BLLD has a collection of four and a half million serials and books, which includes 55,000 serial titles (Information Systems Consultants, Inc., 1983).

EMERGING TECHNOLOGIES IN DOCUMENT DELIVERY

New technologies have had an enormous impact on traditional library services and these rapid changes will probably continue. Information specialists have readily adopted the use of online searching and commercial document suppliers. Full text databases are a relatively new development but more and more publishers are showing an interest in them. Competition in this area should bring down prices.

Electronic mail will be used more and more in the future for the transmission of document requests and even now provides a viable alternative to the OCLC interlibrary loan subsystem.

The technology of telefacsimile is improving each year and may become a prime method of document delivery in the years to come. A telefacsimile is sometimes called a telecopier because it transmits entire documents from a sending machine to a receiving machine via telephone lines or private transmission lines. Many companies are in the facsimile equip-

ment business, such as Xerox, Exxon Office Systems, Burroughs, Panafax, 3M, Rapicom and others. The bulk of the total market is handled by Xerox and Exxon (McQueen and Boss, 1983). The most recent development in this area is "subminute telefacsimile"; this name refers to the machine's ability to transmit a complete page of text in less than one minute. The major limitations of telefacsimile are still image quality, the reliability of the equipment and the cost. At the present time, a large volume of requests and a need for immediacy in document delivery are required to justify the high cost of telefacsimile.

At this point, librarians and their patrons are not accustomed to rapid document delivery methods. However, these methods progress each year and as this service improves, researchers will no longer have to work around the limitations of the system.

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_____ 1980. Document delivery. Online. 4(1): 68.

_____ 1980. Document delivery. Online. 4(2): 70.

_____ 1980. Document delivery. Online. 4(3): 66-67.

_____ 1980. Document delivery. Online. 4(4): 77.

_____ 1981. Document delivery. Online. 5(2): 84.

_____ 1982. Document delivery. Online. 6(4): 74-75.

_____ 1982. Document delivery. Online. 6(6): 64-65.

_____ 1983. Document delivery. Online. 7(2): 82.

_____ 1983. Document delivery. Online. 7(4): 78-79.

_____ 1984. Document delivery. Online. 8(2): 93-94.

_____ 1984. Document delivery. Online. 8(4): 104-105.

Hunt, Dixie L. 1982. Sources of patent copies. Science and Technology Libraries. 2(4): 69-78.

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Martin, Noelene P. 1982. Interlibrary loan in the computer age: the impact of online systems on document delivery. Reference Librarian. (5/6): 57-69.

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Toney, Stephen. 1982. Telefacsimile experiment at the Smithsonian Institution libraries. Serials Librarian. 7(2): 17-26.

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Tucker, Jane C. and Elsie Cerutti. 1982. A guide to locating sources of foreign scientific and technical publications. Science and Technology Libraries. 2(4): 79-112.

Harbor Branch Foundation, Inc. Contribution No. 391.

EPALIT: A DATA MANAGEMENT SYSTEM APPLIED TO THE CONTROL AND RETRIEVAL OF TECHNICAL REPORTS

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The EPALIT data management system is used by the Environmental Research Laboratory, Gulf Breeze, Florida, to preserve and manipulate information in text databases. EPALIT provides the logical resources for data organization, analysis, and retrieval. It is completely interactive and permits natural language searching with full or truncated terms, imbedded word fragments, and Boolean search strings. The library has applied this system to the control and dissemination of its information resources. The Contributions Database, consisting of the laboratory's in-house and extramural publications, is the most sophisticated application to date. EPALIT's features are described in the context of this Contributions Database and its various report formats illustrated.

The Environmental Research Laboratory in Gulf Breeze, Florida was established in 1970 as the Environmental Protection Agency's marine research center for pesticides and toxic substances. Its primary role is to provide the Agency with a scientific base for its regulatory decisions in those areas. Current research programs include developing toxicological test guidelines, determining the effects on marine ecosystems of exposure to toxic substances, and assessing the risks to aquatic environments from genetically altered microorganisms. In addition, the laboratory provides emergency technical assistance in evaluating environmental threats to the Gulf of Mexico and the tropical Atlantic coast. The Gulf Breeze library sup-

ports these research efforts by acquiring, organizing, and disseminating information and materials pertinent to the needs of laboratory personnel. In recent years, the library's performance has been enhanced by the use of an in-house data management system called EPALIT, an acronym for an EPA computerized resource for dealing with text (literature) as data. This integration of computer technology with library functions has greatly expanded the role of the library and the services it can offer.

EPALIT'S DEVELOPMENT

The EPALIT Text Data Management System was developed for the laboratory by Computer Sciences Corporation. Its programs are written in FORTRAN IV and run on a DEC PDP 11/70 minicomputer with data stored on magnetic tape. EPALIT was designed to meet the need for a system capable of handling textual records containing variable length fields without imposing rigid limitations on content or format. It has been used to formulate work plans, collect water quality data, track grants, manage property records, and generate project status reports.

The initial application of EPALIT to a library task was the creation of an on-line card catalog. The success of this project led to the development of other databases for the library's reprint collection, laboratory notebooks, and 35 mm slides. By far the most sophisticated and prolific of the library applications has been the Contribution Database - a catalog of the laboratory's in-house and extramural research publications. It is in the context of this database that EPALIT's features will be described.

INTERACTIVE FEATURES

The Contributions Database can be accessed from anywhere by anyone having the necessary equipment and passwords. The integrity of the database is always fully protected, regardless of the number of people using it. The library staff sign on in a FULL authorization mode which makes available the complete range of EPALIT's interactive capabilities. Patrons sign on in a RESTRICTED mode which allows record retrieval, but does not permit any modification or deletion of database content. Confidential or extraneous information may also be masked from view in the RESTRICTED mode.

Like all EPALIT applications, the Contribution Database is menu-driven (see Fig.1). When operating in FULL mode, it offers the user the following choices: record input, record retrieval, or system termination. Records are added to the database by entering responses to a series of prompts (see Fig.2). Data elements of equal value (co-authors, multiple grant numbers, etc.) are separated by double back slashes. This convention causes the system to treat each element as a unique entry for indexing purposes. Once entered, records can be retrieved by searching a key field, a concatenation of all key fields, or the full text of the database. Key fields are data elements which have been designated key access points (author, title, project officer, Chemical Abstracts Registry number, etc.); these can be changed as retrieval needs change. Search statements may consist of truncated terms or phrases, imbedded word fragments, or Boolean expressions. Search results are displayed one record at a time and may be browsed by hitting the return key. Modification

FIGURE 1

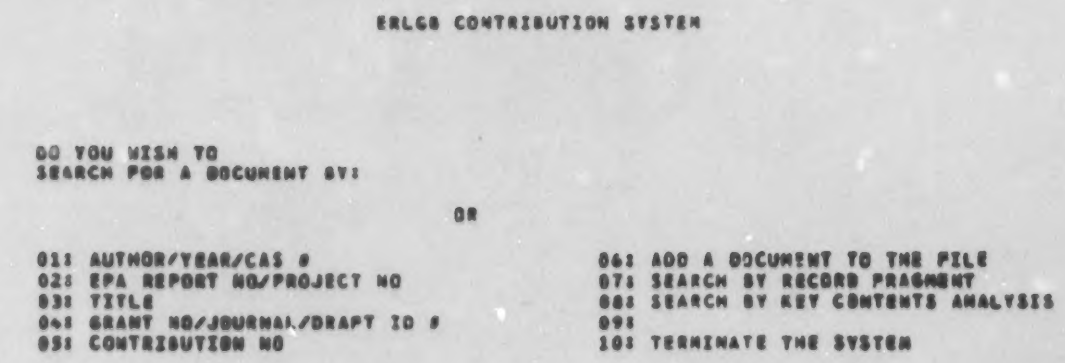
ERLGB CONTRIBUTION SYSTEM
DO YOU WISH TO
SEARCH FOR A DOCUMENT BY:
62
OR
01: AUTHOR/YEAR/CAS #
02: EPA REPORT NO/PROJECT NO
03: TITLE
04: GRANT NO/JOURNAL/DRAFT ID #
05: CONTRIBUTION NO
06: ADD A DOCUMENT TO THE FILE
07: SEARCH BY RECORD FRAGMENT
08: SEARCH BY KEY CONTENTS ANALYSIS
09:
10: TERMINATE THE SYSTEM
76

FIGURE 2

```
NEW RECORD

ENTER ORDIS # :
ENTER AUTHOR :
ENTER TITLE :
ENTER JOURNAL :
ENTER YR :
ENTER VOL :
ENTER ISSUE :
ENTER PAGE NO :
ENTER EDITOR :
ENTER TITLE1 :
ENTER PUBLISHER :
ENTER CONTRIBUTION NO :
ENTER GRANT NO :
ENTER LAB PROJECT NO :
ENTER EPA REPORT NO :
ENTER ABSTRACT :
ENTER NOTES :
ENTER DRAFT ID # :
ENTER PUB TYPE :
ENTER CAS # :
ENTER DATE COMP # ASSIGNED :
```

or deletion of a record can take place only after it has been retrieved for viewing. The menu can be re-displayed at any time by entering a single command. Signing off is simply a matter of selecting the system termination option from the menu.

PRINT OUTPUT

As stated earlier, the Contribution Database is the most prolific of the library applications in terms of print output. Its various reports provide multiple access routes into the collection, enable management to track laboratory production, and inform the public of available research publications.

The simplest products of the database are the key field index reports. These in-

dexes are derived from the key fields and each is arranged alpha-numerically by the indexed field. Record format was modelled after the bibliographies of the National Technical Information Service. Complete citations, document numbers, and notes are included in all indexes; abstracts, however, appear in the title index only. Indexed fields are highlighted to facilitate rapid scanning.

Several reports are generated through keyword analysis of selected fields. Analyses may be run against the entire database or against specific record subsets. They are usually run in the title and/or abstract fields as these exhibit the highest ratio of significant to trivial terms. Analyses are refined by stop- or go-lists which increase the utility of the reports produced. Truncated terms, consisting of root words with asterisk suffixes, can be used to populate these lists. For example, the word "record" followed by an asterisk "*" is interpreted by the system as record, records, recorded, recording, and so on. Truncation streamlines the development of a stop/go-list, but must be used carefully to ensure that terms are not inadvertantly excluded or included. Keyword reports vary in complexity from a straighforward listing of terms with document identifiers to a keyword-out-of-context index of abstract terms with a full paragraph of text surrounding each word. Keyword indexes function primarily as subject guides to the collection and usually lead directly to the source documents via the contribution numbers.

Directory reports are generated for public distribution and are the most polished products of the Contribution Database. They range in content from a selective listing of items chosen on the basis of author, subject,

or grant number to a cumulative listing of every record in the database. The program which generates these reports can accommodate almost any type of publication - journal articles, book chapters, project reports, conference proceedings - as well as items still in preparation or in press. This program reformats each record into a standard citation, omitting all non-bibliographic data except the contribution number and certain notes. Abstracts may be included or not as needed. Arrangement is flexible, but citations are typically grouped by author or publication year. Special input conventions can be used to control the arrangement of a list or to exclude certain publication types. Directory reports are usually supplemented with author and title keyword indexes. These indexes refer not to the document identification numbers, but to pages on which citations appear in the directory. The author indexes contain every author, with joint authorship indicated. An internal name authority file aggregates all of an author's publications under one name in this index, regardless of the variant spellings encountered in the records themselves. Indexing to first author only can be substituted for full author indexing and is particularly useful with larger directories whose size can be prohibitive. The title indexes are keyword-in-context, the context being one line of surrounding title. Abstracts can be indexed along with the titles when comprehensive subject retrieval is required.

SPECIAL REPORTS

In addition to the indexes, keyword reports, and directories which are typical of many bibliographic databases, a variety of

special reports are produced using EPALIT's analytical resources. Two of the most interesting of these are the Sentence Ranking Report and the Best Seller List.

The Sentence Ranking Report is derived from an analysis of the abstract field of a record or group of records. It uses the system's ability to distinguish the beginning and ending of sentences and to identify keywords within them. Sentences are evaluated on the basis of four objective criteria: aggregate character length of non-trivial terms, aggregate character length of all terms, number of non-trivial terms, and sentence position. Each of these measures is weighted according to its merit as an indicator of sentence value. This weight can be redistributed to shift the focus of the analysis as needed. Currently, the ratio of non-trivial characters to total characters is the primary ranking factor, followed by the number of non-trivial terms contained in the sentence, and its position in the abstract. Sentences can be ranked in either ascending or descending order of significance, depending on the intended use of the report. Sentences are grouped in abstract blocks which are identified by document number. Sentence Ranking Reports can be used to get at the "meat" of a group of publications (descending order) or to identify non-significant sentences for revision or deletion (ascending order).

The Best Seller List is just that - a list of the most requested items in the collection during a given month or year. It is derived from a field containing monthly statistics on the number of reprint requests received by the library for each document. Using this information, the system produces a citation list of the ten publications with the highest

number of requests during the indicated period. This report can be used by management to identify areas of growing concern for future research projects.

CONCLUSION

The Contribution Database, backed up by the extensive and flexible resources of the EPALIT Data Management System, has moved the library from a peripheral location in the laboratory to a central position. The library is seen by management and research staff as an information handling and producing facility, not just a repository for books. The system makes it possible for the library to respond to any laboratory information request rapidly, accurately, and, when necessary, with a very polished product. It enables the library to provide resources which can not be acquired anywhere else - tools for tracking laboratory production, tools for responding quickly to emergency requests, tools for making the laboratory's research highly visible to top level administrators and to the public. This database and the other EPALIT applications are anchors which help secure the library's place in the Gulf Breeze laboratory.

SAMPLE REPORTS

The following samples are included to illustrate some of the report formats currently in use at the Gulf Breeze library. These are not all of the reports generated from the Contribution Database, but are representative of the different indexes, keyword analyses, and directories available. The system is flexible enough to allow modification of existing formats and creation of new ones as needed.

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Means, Susan, Russ Ryder, and Andree Lowry. Library System User's Manual. Gulf Breeze, FL, U.S. Environmental Protection Agency, Environmental Research Laboratory. 1984.

ENVIRONMENTAL RESEARCH LABORATORY
GULF BREEZE, FLORIDA 32561
BEST SELLER LIST
SEPTEMBER 1984

DURE, THOMAS W., AND PATRICK R. PARRISH. 1984. RESULTS OF THE DRILLING FLUIDS RESEARCH PROGRAM SPONSORED BY THE GULF BREEZE ENVIRONMENTAL RESEARCH LABORATORY, 1976-1984,AND THEIR APPLICATION TO HAZARD ASSESSMENT. EPA-600/4-84-055, UNITED STATES. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 94P.

HANSEN, DAVID J., AND GERALDINE M. CRIPE. 1984. INTERLABORATORY COMPARISON OF THE EARLY LIFE-STAGE TOXICITY TEST USING THE SHEEPSHEAD MINNOW (CYPRINODON VARIEGATUS). EPA-600/X-84-081, UNITED STATES. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 49P.

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WALSH, G.E. 1984. FINAL REPORT ON EFFECT OF FENTHION ON SELECTED ESTUARINE SPECIES RELATED TO FIELD STUDY. EPA-600/X-84-382, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 5P.

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AVAIL. FROM NTIS, SPRINGFIELD, VA: PB84-151315.

70

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ENVIRONMENTAL RESEARCH LABORATORY
GULF BREEZE, FLORIDA 32561

TITLE

(17 6/8- PAGE 412)

ROSETTE GLANDS IN THE GILLS OF THE GRASS SHRIMP, PALAEMONETES PUGIO. I. COMPARATIVE MORPHOLOGY, CYCLICAL ACTIVITY, AND INNERVATION

JOUGHTIE, DANIEL G., AND K. RAMA RAO

J. MORPHOL. 171(1):41-57. 1982. EPA-600/J-82-150
DRILLING FLUID//CR307417 4403 0225
PB82-237645, PC- A03
ERLGB X238

TWO TYPES OF ENDOCRINE ROSETTE GLANDS (CALLED TYPE A AND TYPE B), LOCATED IN THE GILL AXES OF THE GRASS SHRIMP, PALAEMONETES PUGIO, ARE DESCRIBED. THE TYPE A GLANDS ARE EMBEDDED WITHIN THE LONGITUDINAL MEDIAN SEPTUM OF THE GILL AXES, WHEREAS THE TYPE B GLANDS TYPICALLY PROJECT INTO THE EFFERENT HEMOLYMPH CHANNELS OF THE GILL AXES. ALTHOUGH BOTH GLANDS HAVE CERTAIN COMMON CHARACTERISTICS (I.E., A VARIABLE NUMBER OF RADIALLY ARRANGED SECRETORY CELLS, A CENTRAL INTERCALARY CELL, AND A CANAL CELL THAT FORMS THE CUTICULAR DUCTULE LEADING TO THE BRANCHIAL SURFACE), THEY DIFFER IN THE FOLLOWING RESPECTS. THE TYPE B GLAND IS INNERVATED, BUT THE TYPE A GLAND IS NOT; AXONAL PROCESSES, CONTAINING BOTH GLANDULAR (CA. 900-1300 A) AND AGRANULAR (CA. 450-640 A) VESICLES, OCCUR AT A JUNCTURE BETWEEN ADJACENT SECRETORY CELLS AND THE CENTRAL CELL OF THE TYPE B GLAND. THE SECRETORY CELLS OF TYPE A AND TYPE B GLANDS DIFFER IN THEIR SYNTHETIC POTENTIAL AS MEMBRANE SPECIALIZATIONS. THESE DIFFERENCES ARE MORE PRONOUNCED IN WELL-DEVELOPED, MATURE GLANDS, MOST

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FREQUENTLY ENCOUNTERED IN LARGER (24-28 MM, TOTAL LENGTH) GRASS SHRIMP, THAN IN THE UNDERDEVELOPED, IMMATURE GLANDS THAT ARE MOST ABUNDANT IN SMALLER (14-18 MM, TOTAL LENGTH) GRASS SHRIMP. THUS, IN MATURE GLANDS, THE SECRETORY CELLS OF THE TYPE A ROSETTE GLANDS ARE CHARACTERIZED BY EXTENSIVE RER, ABUNDANT GOLGI, AND NUMEROUS SECRETORY GRANULES, WHEREAS THE SECRETORY CELLS OF THE TYPE B GLAND ARE CHARACTERIZED BY EXTENSIVELY INFOLDED AND INTERDIGITATED BASAL PLASMALEMMAS AND BY THE PRESENCE OF NUMEROUS MITOCHONDRIA. IN GENERAL, BOTH TYPES OF GLANDS EXHIBIT INCREASED SECRETORY ACTIVITY SOON AFTER ECDYSIS. THE CENTRAL AND CANAL CELLS IN BOTH GLANDS SEEM TO HAVE A ROLE IN THE MODIFICATION OF THE SECRETED MATERIALS. THE POSSIBLE FUNCTIONS ASSIGNED TO THE TYPE A GLAND AND THE TYPE B GLAND INCLUDE PHENOLOXIDASE SECRETION AND OSMOREGULATION, RESPECTIVELY.

ROUND-ROBIN ACUTE TOXICITY TESTS WITH SEVEN CHEMICALS AND LARVAE OF THE EASTERN OYSTER (CRASSOSTREA VIRGINICA) (UNPUBLISHED REPORT)
NORTHWICK, PATRICK W., AND JOHN F. ALLEN
U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 1981. 21 P.
QQ99.Q236
ERLGB 187

THIS REPORT CONTAINS THE RESULTS OF OYSTER LARVAL TOXICITY TESTS CONDUCTED AT THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S (EPA) GULF BREEZE LABORATORY WITH SEVEN TEST COMPOUNDS. THE STATIC OYSTER LARVAL TEST WAS ONE OF SEVEN MARINE TOXICITY TESTS CHOSEN FOR ROUND-ROBIN COMPARISON BY THE OFFICE OF RESEARCH AND DEVELOPMENT'S MARINE ENVIRONMENTAL RESEARCH LABORATORIES. THE DATA PRESENTED HERE WILL BE ANALYZED AND COMPARED WITH RESULTS GENERATED IN OTHER GOVERNMENT AND CONTRACT LABORATORIES WHICH PARTICIPATED IN THE INTERLABORATORY COMPARISON, OR ROUND-ROBIN.

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KEY TERM FREQUENCY COUNT

FLOW	92	POLLUTION	106
POLLUTANTS	92	TOXIC	106
COMPARED	93	LEVELS	108
CONDUCTED	93	PESTICIDE	109
MEASURED	93	TESTS	110
PUBLIC	94	DETERMINE	112
IMPACT	95	ANIMALS	115
SYSTEMS	95	CONTROL	117
TIME	95	TEST	118
LIFE	97	RESULTS	119
FIELD	98	SEAWATER	123
DRILLING	99	DATA	126
SYSTEMS	99	GROWTH	133
NATURAL	90	CHEMICAL	135
PALAEMONETES	90	ORGANISMS	138
LOW	93	AQUATIC	140
BIOLOGICAL	94	CONCENTRATION	142
COMPOUNDS	94	ENVIRONMENT	157
FLORIDA	94	PESTICIDES	165
GULF	94	SHRIMP	167
FOUND	95	EXPOSURE	171
GAS	95	SPECIES	197
HIGH	95	TOXICITY	203
DAYS	97	ENVIRONMENTAL	204
DEVELOPMENT	101	FISH	209
WATER	101	LABORATORY	209
LESS	104	CONCENTRATIONS	215
SIGNIFICANT	105	MARINE	306

TERM WITH RECORD IDENTIFIER

MINING
X142

MINISTRIES
X182

MINNOW
218 X222// IN PRESS X222 426 EP4-503/9-83-005 374
X176 EP4-503/4-81-003 247 284 X196 X356 311-
186 394 263- 277- 269 267- X334 335

MINNOWS
X160 296 X036- 425 433 177- X264 344-
EP4-503/3-77-059 234- X254 203 175- 277- 478
229 222 X073- 075 113 293 X094- 383-
076- 346 EP4-500/3-78-010 EP4-503/3-77-059 462 130-
181- EP4-500/3-82-07[illegible] EP4-503/4-81-041 125- X049 299

MINOR
X140- X033- 065 203 373 EP4-503/3-76-044

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374

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MINUTES
032- X045- 038- 064- 465 401 573

MIOTIC
X154-

MIREX
X097- 155- 243 197 268 193 199 303
EPA-600/3-75-024 137- 229 EPA-600/3-76-007 EPA-600/3-75-015
EPA-600/3-76-048 124 168 229 222 156-
X287 168 X185 255- 222 155- EPA-600/3-75-015
EPA-600/3-75-024 305- 155- EPA-600/3-76-048 X048

MIRRORS
X303

MISCELLANEOUS
X165- X368

MISIDENTIFIED
X052-

MISLEADING
X180- X353

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SHRIMPS (ARTHROPODA: CRUSTACEA: PENAEIDAE)/,6-1

VERTEBRAL DYSPLASIA IN YOUNG FISH EXPOSED TO THE HERBICIDE TRIFLURALIN/,5-1

VIRAL DISEASES OF INVERTEBRATES OTHER THAN INSECTS/,6-2

COUCH, JOHN A., JOINT AUTHOR.
CAN TISSUE ANOMALIES THAT OCCUR IN MARINE FISH IMPLICATE SPECIFIC POLLUTANT CHEMICALS?/,30-2

CORRELATION OF MIXED-FUNCTION OXIDASE ACTIVITY WITH ULTRASTRUCTURAL CHANGES IN THE LIVER OF A MARINE FISH/,36-2

HEMATOPOIETIC NEOPLASMS IN INVERTEBRATES AND COLD-BLOODED VERTEBRATES/,13-1

PATHOBIOLOGICAL MEASURES OF MARINE POLLUTION EFFECTS/,15-3

USEFULNESS OF CYPRINODON VARIEGATUS AND FUNDULUS GRANDIS IN CARCINOGENICITY TESTING: ADVANTAGES AND SPECIAL PROBLEMS/,10-1

COURTNEY, LEE A.
USEFULNESS OF CYPRINODON VARIEGATUS AND FUNDULUS GRANDIS IN CARCINOGENICITY TESTING: ADVANTAGES AND SPECIAL PROBLEMS/,10-1

COURTNEY, LEE A., JOINT AUTHOR.
AMERICAN OYSTER (CRASSOSTREA VIRGINICA) AS AN INDICATOR OF CARCINOGENS IN THE AQUATIC ENVIRONMENT/,5-2

KEYWORD TITLE INDEX

	P	T
A		
ABILITY OF AMBYSTOMA TIGRINUM HEPATIC MICROSOMES FROM POLYCYLIC AROMAT	1-	2
ABSORPTION WITH DIGESTED LEAD PERIODATE /,DETERMINATION OF 1,2-DIOLS B	39-	3
ACCUMULATION OF NAPHTHALENE BY THE OYSTER OSTREA EDULIS, IN A FLOW THR	32-	1
ACID TAURINE /,THIN-LAYER SEPARATION OF CITRIC ACID CYCLE INTERMEDIATE	32-	2
" CYCLE INTERMEDIATES, LACTIC ACID, AND THE AMINO ACID TAURINE /,TH	32-	2
" AND THE AMINO ACID TAURINE /,THIN-LAYER SEPARATION OF CITRIC ACID	32-	2
ACTIVATION /,DETERMINATION OF VANADIUM IN A MARINE MOLLUSC USING A CHE	17-	1
ADDUCTOR MUSCLE PROTEINS FROM BIVALVE MOLLUSCS /,EFFECTS OF SODIUM CHL	36-	2
ADVANTAGES AND SPECIAL PROBLEMS /,USEFULNESS OF CYPRINODON VARIEGATUS	10-	1
AFLATOXIN IN THE BROWN BULLHEAD ICTALURUS NEBULOSIS. M.S. THESIS /,EF	6-	1
ALTERATIONS IN CARCINOGEN-EXPOSED TELEOSTS: PROCEDURES FOR PREPARATIO	21-	1
AMBYSTOMA TIGRINUM HEPATIC MICROSOMES FROM POLYCYLIC AROMATIC HYDROCAR	1-	2
AMERICA /,CELLULAR PROLIFERATIVE DISORDER IN OYSTERS (OSTREA CHILENSIS	25-	2
AMERICAN OYSTER (CRASSOSTREA VIRGINICA) AS AN INDICATOR OF CARCINOGENS	5-	2
" OYSTER CRASSOSTREA VIRGINICA /,BENZO(A)PYRENE METABOLISM IN T	1-	1
" OYSTER (CRASSOSTREA VIRGINICA) /,CONCURRENT NEOPLASTIC AND PR	4-	2
AMINES /,DIFFERENTIAL ABILITY OF AMBYSTOMA TIGRINUM HEPATIC MICROSOMES	1-	2
AMINO ACID TAURINE /,THIN-LAYER SEPARATION OF CITRIC ACID CYCLE INTERM	32-	2
AMMONIA FROM SMALL VOLUMES OF SEAWATER /,ION-EXCHANGE TECHNIQUE FOR CO	33-	1
ANIMAL MODEL FOR EXPERIMENTAL CARCINOGENESIS /,RAINBOW TROUT (SALMO GA	14-	1
" IN STUDIES INVOLVING CARCINOGENESIS, TERATOGENESIS AND MUTAGENE	16-	1
ANIMALS AS INDICATORS OF ENVIRONMENTAL EXPOSURES /,AQUATIC	14-	3
" /,EFFECTS OF CARCINOGENS, MUTAGENS, AND TERATOGENS IN NON-HUM	6-	1
" /,EFFECTS OF CARCINOGENS, MUTAGENS AND TERATOGENS IN NON-HUMAN	7-	2
" /,EFFECTS OF CARCINOGENS, MUTAGENS, AND TERATOGENS IN NON-HUM	6-	1
" INDUCED BY CONTROLLED EXPOSURES TO ENVIRONMENTAL CONTAMINANTS,	23-	1

84

ANOMALIES THAT OCCUR IN MARINE FISH IMPLICATE SPECIFIC POLLUTANT CHEMI 30- 2
APPLICATION IN CARCINOGEN EXPOSURE STUDIES /,PRIMARY CELL CULTURES FRO 20- 1
AQUATIC ENVIRONMENT /,AMERICAN OYSTER (CRASSOSTREA VIRGINICA) AS A IN 5- 2
" ANIMALS AS INDICATORS OF ENVIRONMENTAL EXPOSURES 5- 2
" ANIMALS) /,EFFECTS OF CARCINOGENS, MUTAGENS, AND TERATOGENS IN 8- 1
" ANIMALS /,EFFECTS OF CARCINOGENS, MUTAGENS AND TERATOGENS IN M 7- 2
" ANIMALS) /,EFFECTS OF CARCINOGENS, MUTAGENS, AND TERATOGENS IN 8- 1
" ANIMALS INDUCED BY CONTROLLED EXPOSURES TO ENVIRONMENTAL CONTA 23- 1
AROCLOR 1254-TREATED MULLET (MUGIL CEPHALUS) /,BENZO(A)PYRENE METABOLI 39- 1
" 1254 TREATED MULLET /,METABOLITES OF BENZO(A)PYRENE I 38- 1
AROMATIC HYDROCARBONS IN BAY MUSSELS (MYTILUS EDULIS) FROM OREGON, USA 28- 1
" HYDROCARBONS IN SOFTSHELL CLAMS FROM COOS BAY, OREGON, USA /, 28- 1
" HYDROCARBONS AND AROMATIC AMINES /,DIFFERENTIAL ABILITY OF AM 1- 2
" AMINES /,DIFFERENTIAL ABILITY OF AMBYSTOMA TIGRINUM HEPATIC M 20- 2
" HYDROCARBONS (ABSTRACT) /,EXPOSURE OF TWO TELEOST SPECIES TO 20- 2
" HYDROCARBONS (ABSTRACT) /,INDUCTION OF GLUCURONIDE AND SULFA 36- 3
" HYDROCARBONS AND CELLULAR PROLIFERATIVE DISORDERS IN BIVALVE 25- 1
" HYDROCARBONS IN BIVALVE MOLLUSKS IN BAY MUSSELS (MYTILUS EDUL 28- 3
" HYDROCARBONS DUE TO SLASH BURNING ON CLEAR-CUT SITES /,PYROLY 37- 2
" HYDROCARBONS AND METALS IN MOLLUSCS (ABSTRACT) /,STUDIES ON P 24- 1
ARSENIC AND OTHER TRACE ELEMENTS IN BAY MUSSELS (MYTILUS EDULIS) /,SPA 17- 3
ASSAY SYSTEM UTILIZING ESTUARINE FISHES /,DEVELOPMENT OF A CARCINOGEN 19- 2
" FOR EPOXIDE HYDROLASE /,INDIRECT ATOMIC ABSORPTION SPECTROMETRIC 38- 2
" SUBJECTS /,LABORATORY EVALUATION OF MARINE FISHES AS CARCINOGEN 5- 1
ATOMIC ABSORPTION WITH DIGESTED LEAD PERIODATE /,DETERMINATION OF 1,2- 39- 3
" ABSORPTION SPECTROMETRIC ASSAY FOR EPOXIDE HYDROLASE /,INDIRECT 38- 2

BACTERIA SYSTEM. M.S. THESIS /,EVALUATION OF BENZO(A)PYRENE METABOLIS 2- 2

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IDENTIFICATION : EPA-600/3-83-021

TOXICITY OF USED DRILLING FLUIDS TO EMBRYO DEVELOPMENT WAS INVESTIGATED TO ASCERTAIN THE LIMITS OF SAFE USAGE OF THESE FLUIDS IN MARINE ENVIRONMENTS.

OTHERS ARE RELATIVELY INNOCUOUS, REQUIRING VERY LITTLE DILUTION TO ACHIEVE A CONCENTRATION IN WHICH EMBRYO DEVELOPMENT CAN PROCEED NORMALLY.

STUDIES DEMONSTRATED THAT NO SINGLE DRILLING FLUID IS "TYPICAL" AND THAT THE QUANTITATIVE EFFECTS OF EMBRYOS VARY CONSIDERABLY FROM ONE FLUID TO ANOTHER.

IN ADDITION, SEVERAL COMMERCIAL DRILLING FLUID COMPONENTS WERE EXAMINED IN THE TEST SYSTEMS INCLUDING A SYNTHETIC REFERENCE MUD.

THIS VARIABILITY IS NOT MENTIONED TO SUGGEST THE ACTIVE COMPONENTS, OF WHICH WE HAVE NO KNOWLEDGE, BUT ONLY TO ILLUSTRATE THE "NON-TYPICAL" NATURE OF ANY ONE SAMPLE.

THE DRILLING FLUIDS TESTED CAME FROM VARIOUS SOURCES; 24 DIFFERENT SAMPLES WERE EVALUATED.

SOME DRILLING FLUIDS ARE QUITE TOXIC TO ONE OR MORE OF THE EMBRYO SYSTEMS, REQUIRING DILUTIONS OF OVER 10(5) TO BECOME "SAFE".

IDENTIFICATION : EPA-600/4-81-031

THE BIOMASS MEASURED BY THE EXTRACTABLE PHOSPHOLIPID AND THE TOTAL LIPID PALMITIC ACID SHOWED EXCELLENT CORRELATION WITH THE FATTY ACID "SIGNATURES" CHARACTERISTIC OF BACTERIA, BUT SHOWED A LOWER CORRELATION WITH THE LONG-CHAIN POLYENOIC FATTY ACIDS CHARACTERISTIC OF THE MICROFAUNA.

STUDIES WITH TERRESTRIAL PLANTS IN LABORATORY AND FIELD EXPERIMENTS SHOW THAT THE FLUIDS AND SOME FLUID COMPONENTS EXHIBIT PHYTOTOXICITY PROPERTIES REDUCING SEED GERMINATION, GROWTH AND YIELD.

INTRODUCTION INTO THE ENVIRONMENT OF THE CHEMICALLY COMPLEX FLUIDS HAS PROMPTED EFFECTS RESEARCH ADDRESSING TERRESTRIAL AND FRESHWATER HABITATS AND THEIR RESPECTIVE BIOLOGICAL COMPONENTS.

THE FLUIDS PERFORM A MULTIPLICITY OF FUNCTIONS, RANGING FROM LUBRICATING TO PREVENTION OF BLOWOUTS WHEN ENCOUNTERING HIGH PRESSURE.

THE RANGE OF LETHAL CONCENTRATIONS OF FLUID COMPONENTS IN TOXICITY STUDIES WAS FROM LESS THAN 1 TO 75,000 MG/L AND THAT FOR WHOLE DRILLING FLUIDS FROM 0.29 TO 95% BY VOLUME.

PREFERENCE/AVOIDANCE REACTIONS OBSERVED IN EXPERIMENTS WITH WHOLE DRILLING FLUIDS ARE ALSO COLLATED AND DISCUSSED.

DRILLING FLUIDS REPRESENT AN IMPORTANT ASPECT OF OFFSHORE AND LAND BASED DRILLING OPERATIONS.

PHYTOTOXICITY IN WHOLE DRILLING FLUIDS IS ATTRIBUTED TO SOLUBLE SALT CONCENTRATIONS.

JOURNAL USE STUDY

Catherine Norton, Assistant Librarian
Marine Biological Laboratory Library

The Rockefeller Foundation funded a Journal Use Study at the Marine Biological Laboratory/Woods Hole Oceanographic Institution Library in Woods Hole, MA, from March 1 through December 31 of 1983. The study was to measure the frequency of use of all the journal titles held by the library. The serial holdings of the library were classified according to their LC headings and a mini-database was created to tabulate use of the journal titles. The results were that 56% of the total usage centers around the journals that were received during the 10 month survey period and 65% of the total use centered around 252 titles which were used more than 100 times each. A citation study was implemented to check the validity of the use scores and a very high correlation resulted. The computer-generated reports which resulted from the creation of the mini-database will provide useful information for future collection development policies.

With the interest and support of the Rockefeller Foundation, the Joint Management Committee and the Library Users Committee, The Marine Biological Laboratory/Woods Hole Oceanographic Institution Library (MBL/WHOI Library) in Woods Hole, Massachusetts, conducted a major study of journal use patterns of the unique scientific periodicals collection in the library from March 1 through December 30 of 1983.

The main purpose of this study was solely to measure the frequency of use of the journal titles held by the library.

The objective in this study was to gain an unbiased basis for developing collection policies and to analyze library use with the goal of increasing the responsiveness of library

acquisitions and services to the user.

This library study incorporated the use record of all the journals in the MBL/WHOI Library and most off-site reading rooms on the WHOI campus. Major interest was centered around:

What are the titles of the most used journals?
Which journals are not used?
What proportion of the collection is used?
What proportion of the collection is little used or not used at all?

METHODS

Before the actual recording of use was started, two major projects were undertaken. The library had never classified its journals in any way other than alphabetically both in the catalog and in the stacks. The books had all been converted to the Library of Congress classification more than 20 years earlier, and the first thing the survey staff undertook was to do the same for all the journals. Most of the currently received journals are purchased through the Faxon Subscription Agency, and they sent our list to us sorted in the various LC headings; other union lists and some original cataloging completed the conversion.

Next a mini-database with 97 fields for each title was created using a WANG 2200 mini-computer with the TOM EZ-SPEED software authored by the Office Manager, Inc. (TOM), Seattle, Washington. Most of the fields associated with each journal title pertained to the use survey, but a number of bookkeeping fields were also added such as price, shelf space, location, language, classification, etc., which will enable the library staff to analyze future

needs.

The method used to collect data was developed in order to have an operational mechanism which did not require the staff to be present since the library is open 24 hours a day, 365 days a year, and the staff is on the premises only 12 hours each day during the week and not at all on weekends. The method used could be duplicated by almost any library as a measurement method at minimal cost.

To measure the frequency of use for new journals, readers were asked to make an appropriate check mark on labels attached to the covers of the journals. In the stacks, readers were asked not to reshelve journals. The library staff made appropriate notes on lists attached to the journals and placed a dot on the spine to indicate the journal had been used. This was done to facilitate counting at the end of the study. Only the volumes with dots on the spines were pulled to tabulate the notation inside. This alleviated the necessity of pulling every volume in the stacks. The journals which were not in the main library but housed in various WHOI Reading Rooms were treated as current journals. Labels were attached to the covers with the appropriate numbers to check, and the title and year were listed on the label for tabulation at the end of the survey.

The frequency of computer searches and interlibrary loans, both incoming and outgoing, was also tabulated.

Obviously this study required the collection and analysis of enormous quantities of data - follow up studies and omissions will be covered in in-house reports long after this initial data gathering report is completed. Also to be considered is the inherent bias which results in this type of survey:

1. Journals only recently subscribed to will have only relatively recent issues available.

2. Journals that have been discontinued do not have current issues available.

3. The length of time journals stayed in the copy service room.

4. Approximately 30% of the users did not follow directions correctly or disregarded them entirely.

5. Reconstruction inconveniences lowered use in the beginning months of the survey.

RESULTS

56% of the total usage of all the journal titles centered around the journals that were received during the 10 month survey period.

76% of the total usage of all the journal titles was measured in the preceding 4 years: 1980 - 83.

24% of the total usage recorded took place in the years pre 1900-1979 (Table 1).

53% of the journal titles in the collection were used during the survey (Table 2).

TABLE 1

Journal Use during Survey Period

PERIOD	USE	PERIOD	USE
Pre-1900	618	1901-1940	2,105
1941-1960	3,237	1961-1979	21,614
1980-1983	86,806	10 Month*	(64,304)

TOTAL 114,906

*Journals received during survey period

TABLE 2

Journal Use by Titles

	No. of Journals	%	No. of Uses	%
JOURNAL TITLES	4,765	100%	114,906	100%
JOURNAL TITLES USED	2,501	53%	114,906	100%
JOURNAL TITLES ACTIVE*	2,437	51%	111,886	97%
(Active titles used)**	(2,029)	(81%)		
JOURNAL TITLES NON-ACTIVE†	2,328	49%	3,020	3%
(Non-Active titles used)**	(472)	(19%)		

* Journals received on a continuing basis

† Journals not being received due to cancellation or cessation

** 81% of the active titles were used during the survey, and only 19% of the non-active titles were used

USAGE VERSUS COLLECTION SIZE

The total usage parallels the collection size. The larger the collection is in a particular subject (ZOOLOGY-QL) the more use it supports (Figure 1).

Over 65% of the total use centered around 250 titles which were used more than 100 times each and 64% of that use took place in the previous 4 years which adds weight to the findings of most bibliometric researchers who agree with Garfield's Law of Concentration which states that "for any field of science, articles are concentrated essentially within the same highly-cited or multidisciplinary journals."[1] (See Figure 2.)

Although the library holds journals in over 30 different languages, the top 250 journals were all in English or had English abstracts. Also, more than half of these journals (133) fall in the Q-GENERAL SCIENCE, QH-BIOLOGY, AND QP-PHYSIOLOGY classifications. Only one title, CHEMICAL ABSTRACTS, is not currently being received since the library

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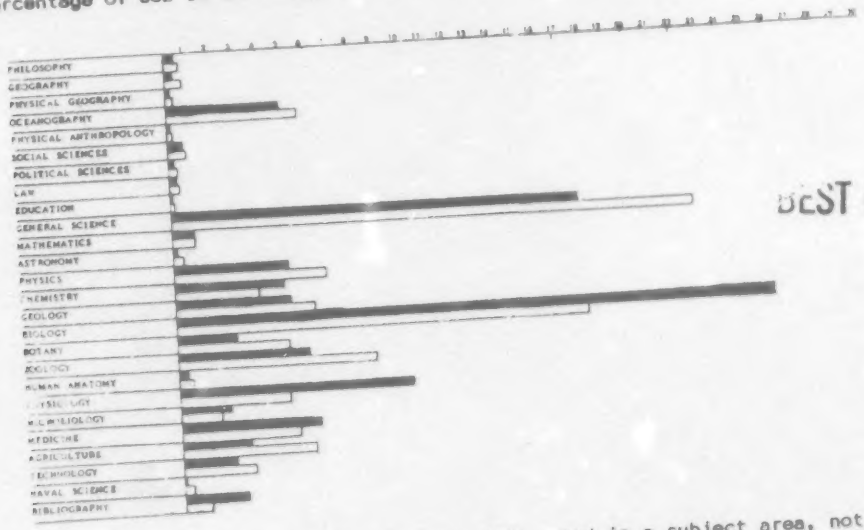
FIGURE 1

percentage of titles held in a subject area in the library collection

percentage of USE in the subject area



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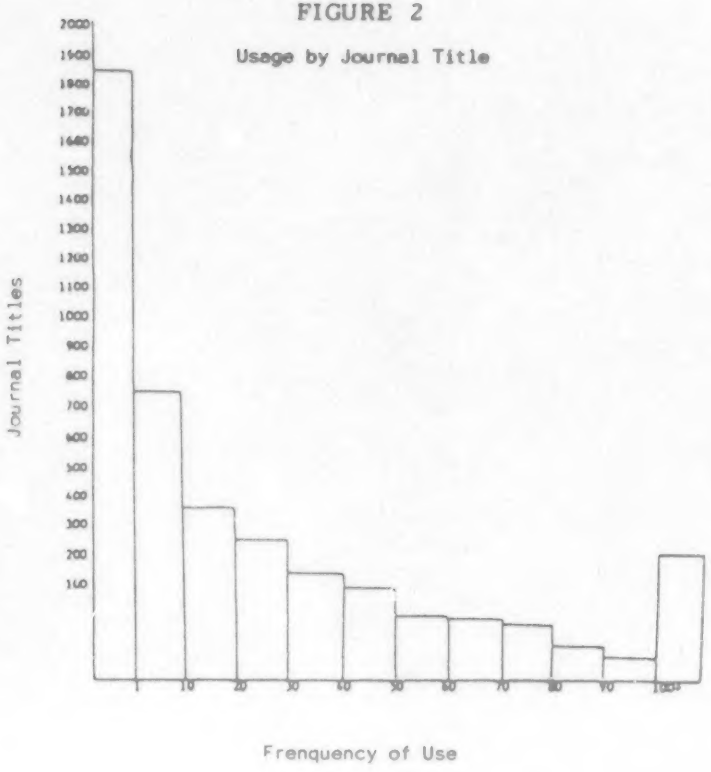
Note: This figure refers to the percentage of titles used in a subject area, not the number of volumes. A title may have from a very few to several hundred volumes in the library.

FIGURE 2



staff has done all the Chemical Abstract searching on-line for the library users since 1983.

47% of the journal titles were not used during this 10 month period; and after initial examination most of the titles were found to be cancelled, had ceased publication, or were not received during the survey's 10 month period. A significant number of exchanges fell in this area. Journals with 0-10 uses, which the library paid for, totaled 352 and the library committee along with the librarians will take a close look at these titles.

Although the main purpose of this study was to gain information for collection policies based on total journal use, we also compared our journal use with the citation frequency as reported in the Journal of Citation Reports 1982.[2]

Table 3 shows the top MBL/WHOI use compared with the Journal of Citation Reports ranking.

TABLE 3

Journals Ranked by Times Cited in 1982

MBL TOP USAGE	TITLE	SCI RANK
1.	NATURE	3
2.	SCIENCE	7
3.	P NATL ACAD SCI USA	4
(4)	SCIENCE CITATION INDEX	-
4.	BIOCHEM BIOPHYS ACTA	5
(5)	BIOLOGICAL ABSTRACTS	-
5.	J CELL BIO	22
6.	MAR BIOL	280
7.	J BIOCHEM-TOYKO	114
8.	BIO BULL	412
(9)	CURRENT CONTENTS	3096
(9)	SCIENCE 83	-
9.	DEEP-SEA RES	493
10.	J PHYSIOL-LONDON	24

Note: Numbers in parens represent non-journal titles.

It was expected that a low correlation between the two lists would result since we included the abstract and index services in our usage study and SCIENCE 83 could not be included in an 82 report. Also we compared usage with number of citations recorded which are two different kettles of fish. We did feel that it was a valid comparison since citation reporting implies use, and the literature of marine biology is multidisciplinary and is indexed in Science Citation Index. The

conclusion we could draw from this comparison is similar to the one which Barbara A. Rici[3] found in the study of the Suny Science Library: "Using a standard list of important journals or a list developed in another collection does not appear to be satisfactory for collection development decisions."

An additional search of the 1983 literature was conducted in the ISI Data Base on the Woods Hole Zip Code to identify some of the journals in which the Woods Hole scientists were publishing. A representative sample of close to 500 references was retrieved which carried the Woods Hole Zip Code.

Following some of the principles of the Lopez Method[4] the library staff set out to determine if our recent journal study was valid and at the same time determine the depth of our collection.

We did follow the suggestions made by Nisonger[5] in his study at the University of Manitoba and made adjustments in the number of references, the number of levels searched, and the scoring system.

After examining the 500 references, it was determined that the Woods Hole scientists published in 176 different journals in 1983. Only 12 of the journal titles were not owned by the library. A second, third, and fourth generation search was undertaken. We added a second dimension to the second, third, and fourth levels by checking all the bibliographies of the citations searched by checking for ownership of all the references in the journals the library owned. At the second level we chose every 25th citation of the first 500 which was 42. The library held 36 of the references. Each bibliography from the 36 was searched and 873 citations were recorded and checked against our holdings in the computer. 829 were found! For the third level we took ap-

2.5
2.2
2.0
2.8
3.2
3.6
4.0
PG
100 mm
1.0
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1.25
1.4
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1.3
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890
1.0 mm
1.5 mm
2.0 mm
A5

proximately every third bibliography for ownership and continued this procedure for the succeeding levels. (See Table 4.)

Since all of the original citations we retrieved were in 1983 and the resulting bibliographies did not go back any further than the 1940's in most cases, our rate of hits was extremely high. Also, since our aim was to check the validity of the 1983 study not to evaluate the collection, we did not encounter some of the characteristics one may find when searching older titles in books; such as incomplete references.[6]

The conclusion drawn from this quick check on the validity of the study does indicate that the library holds most of the journals in which the Woods Hole scientists are publishing, and we hold most of the retrospective material cited in their articles. Also, most of the journals in which MBL/WHOI scientists are publishing rank in the top percent in frequency of use in our Use Study. (See Table 5.)

The bibliographies of two 1983 Doctoral Dissertations, one from the Boston University Marine Program (located at the MBL) and the other from the Woods Hole Oceanographic Joint Program (MIT), were examined. The BUMP paper dealt with invertebrate taxonomy, and the subject of the WHOI paper was sedimentology. The bibliography of the BUMP dissertation contained 369 journal citations spanning the years 1785-1982, with very few citations from the 1700's, many from the 1800's, and most from the 1900's. Of the 369 journal titles listed, the library owned 336 (91%). The WHOI bibliography contained 89 journal citations, of which the library owned 77 (86%). The citations in this bibliography spanned the years 1914-1983 with the vast majority of them

between 1953-1983.

Special attention was given to the citation analysis since there was a fear (unfounded) that the users would mark journals in order to show high usage of some of their favorite journals.

SUMMARY

As with all use surveys there were many technical problems which the staff encountered along with the bias problem that is inherent in use surveys. The cooperation level was very high in this survey due to the caliber of users, mostly professional scientists, and over one thousand notices were sent out originally detailing the reasons for the study. Since marine science and oceanography are really multidisciplinary and the core literature overlaps between disciplines, we could conclude that the use of our journals does center around a core of 500 journals. Garfield maintains that "So large is the overlap between disciplines, in fact, that the core literature for all scientific disciplines involves a group of no more than 1,000 journals, and may involve as few as 500."[6] However, since we are basically a research library and 24% of the total use of our journals did cover the 1700's, 1800's, and early 1900's, close scrutiny of these journal titles will have to be examined while developing future collection policies. 76% of the total usage of all journal titles was measured in 1980-1983. The most valuable result of this study is the computer-generated reports of the serials list which will provide a basis for future collection development and management studies.

TABLE 4

Qualitative Index A

FIRST LEVEL

Number of citations	500
Library owned	488
Library lacked	12
Possible level value	(Value of 1 x 500 = 500)
Actual level value	(Value of 1 x 488 = 488)

SECOND LEVEL

Number of citations	42
Library owned	36
Library lacked	6
Possible level value	(Value of 2 x 42 = 84)
Actual level value	(Value of 2 x 36 = 72)

THIRD LEVEL

Number of citations	15
Library owned	13
Library lacked	2
Possible level value	(Value of 3 x 15 = 45)
Actual level value	(Value of 3 x 13 = 39)

FIRST LEVEL OF BIBLIOGRAPHIES

Number of citations	873
Library owned	829
Library lacked	44
Possible level value	(Value of 1 x 873 = 873)
Actual level value	(Value of 1 x 829 = 829)

SECOND BIBLIOGRAPHIC LEVEL

Number of citations	356
Library owned	347
Library lacked	9
Possible level value	(Value of 2 x 356 = 712)
Actual level value	(Value of 2 x 347 = 694)

TABLE 4 (con't)

FOURTH LEVEL		THIRD BIBLIOGRAPHIC LEVEL	
Number of citations	10	Number of citations	228
Library owned	9	Library owned	217
Library lacked	1	Library lacked	11
Possible level value	(Value of 4 x 10 = 40)	Possible level of value	(Value of 3 x 228 = 684)
Actual level value	(Value of 4 x 9 = 36)	Actual level value	(Value of 3 x 217 = 651)
TOTALS - For all levels		TOTALS - For all levels	
Possible	669	Possible	1457
Actual	635	Actual	1393

97

TABLE 5

Sample of Journal Titles Woods Hole Scientists Published in During 1983

	NO. OF ARTICLES	USAGE RANK
American Association of Petroleum Geologists Bulletin	16	76
American Zoologist	10	113
Biological Bulletin	33	10
Biophysical Journal	16	56
Canadian Journal of Fisheries and Aquatic Sciences	10	53
Journal of Cell Biology	14	7
Journal of Geophysical Research-Oceans and Atmosphere	13	17
Journal of Physical Oceanography	25	86
Nature	14	1
Science	17	2

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MARINE BIOLOGICAL LABORATORY
JOURNALS USED 100 X'S OR MORE
SERIAL USE

MARINE BIOLOGICAL LABORATORY

JOURNALS USED 100 X'S OR MORE

10/16/84

SERIAL USE

ID	Partial Title	LC	STATUS	1990 - 95 CUR USE
NA200	NATURE: LONDON	Q	Y	2,938.0
SC025	SCIENCE: WASHINGTON, D.C.	Q	Y	1,709.0
PR290	PROCEEDINGS OF THE NATIONAL AC	Q	Y	1,155.0
ZZ355	SCIENCE CITATION INDEX: PHILAD	Z	Y	1,298.0
BI095	BIOCHIMICA ET BIOPHYSICA ACTA	QH	Y	860.0
ZZ180	BIOLOCICAL ABSTRACTS 1926: PHI	QH	Y	856.0
JO114	JOURNAL OF CELL BIOLOGY: NEW Y	QH	Y	608.0
MA070	MARINE BIOLOGY: BERLIN.	QH	Y	651.0
JO092	JOURNAL OF BIOLOGICAL CHEMISTR	QD	Y	699.0
BI175	BIOLOGICAL BULLETIN 1899: WOOD	QH	Y	296.0
CU025	CURRENT CONTENTS: LIFE SCIENCE	Q	Y	1,000.0
SC030	SCIENCE (YEAR [illegible] PUBLICATION):	Q	Y	975.0
JO510	JOURNAL OF PHYSIOLOGY: LONDON	QP	Y	472.0
ZZ240	DEEP SEA RESEARCH 1953: LONDON	GC	Y	602.0
DE085	DEVELOPMENTAL BIOLOGY 1959: NE	QH	Y	615.0
CE005	CELL 1974: CAMBRIDGE, MASS.	QH	Y	688.0
JO276	JOURNAL OF GEOPHYSICAL RESEARC	QC	Y	506.0
JO222	JOURNAL OF EXPERIMENTAL MARINE	QH	Y	547.0
CO125	COMPARATIVE BIOCHEMISTRY AND P	QP	Y	495.0
NE135	NEW SCIENTIST: LONDON	Q	Y	690.0
BR005	BRAIN RESEARCH 1966: AMSTERDAM	QP	Y	558.0
NE100	NEW ENGLAND JOURNAL OF MEDICIN	R	Y	620.0
MA085	MARINE ECOLOGY-PROGRESS SERIES	QH	Y	615.0
LI040	LIMNOLOGY AND OCEANOLOGY: BALT	GC	Y	237.0
EX015	EXPERIMENTAL CELL RESEARCH: NE	QH	Y	385.0
BI085	BIOCHEMISTRY 1962: WASHINGTON	QH	Y	404.0
BI050	BIOCHEMICAL PHARMACOLOGY 1958:	R	Y	526.0
LA025	LANCET: LONDON	R	Y	537.0
JO172	JOURNAL OF COMPARATIVE PHYSIOL	QP	Y	413.0
ZZ291	INDEX MEDICUS: AMERICAN MEDICA	Z	Y	429.0
JO398	JOURNAL OF MOLECULAR BIOLOGY:	QH	Y	364.0
JO260	JOURNAL OF GENERAL PHYSIOLOGY:	QP	Y	231.0
JO352	JOURNAL OF THE MARINE BIOLOGIC	QH	Y	198.0
PR450	PROCEEDINGS OF THE ROYAL SOCIE	Q	Y	313.0
SC080	SCIENCE NEWS: WASHINGTON, D.C.	Q	Y	452.0
EA005	EARTH AND PLANETARY SCIENCE LE	QE	Y	243.0
ES015	ESTUARINE, COASTAL AND SHELF S	GC	Y	340.0
SC215	SCIENTIFIC AMERICAN: NEW YORK	Q	Y	274.0
CE045	CELL AND TISSUE RESEARCH 1924:	QH	Y	333.0
JO382	JOURNAL OF MEMBRANE BIOLOGY: N	QH	Y	348.0
FE001	FEBS LETTERS: AMSTERDAM	QP	Y	354.0
AM220	AMERICAN NATURALIST 1867: AMER	QH	Y	218.0
JO168	JOURNAL OF COMPARATIVE NEUROLO	QP	Y	314.0
AQ010	AQUACULTURE 1972: THE NETHERLA	S	Y	315.0
CO172	COMPTES RENDUS DES SEANCES DE	Q	Y	399.0
JO354	JOURNAL OF MARINE RESEARCH:	GC	Y	202.0
AN140	ANALYTICAL BIOCHEMISTRY 1960:	QP	Y	249.0
BI030	BIOCHEMICAL AND BIOPHYSICAL RE	QH	Y	266.0
PH040	PHILOSOPHICAL TRANSACTIONS OF	Q	Y	281.0
JO226	JOURNAL OF EXPERIMENTAL ZOOLOG	QL	Y	218.0
JO428	JOURNAL OF NEUROSCIENCE: BALTI	QP	Y	370.0
ZZ225	CHEMICAL ABSTRACTS 1907:	Z	N	275.0
CA135	CANADIAN JOURNAL OF FISHERIES	S	Y	365.0
GE060	GEOCHIMICA ET COSMOCHIMICA ACT	QE	Y	218.0
EC050	ECONOMIST (THE): LONDON	H	Y	356.0
BI360	BIOPHYSICAL JOURNAL 1960: NEW	QH	Y	273.0
CU030	CURRENT CONTENTS: AGRICULTURE,	Q	Y	348.0
BI045	BIOCHEMICAL JOURNAL 1906: LIVE	QH	Y	209.0
JO252	JOURNAL OF FLUID MECHANICS: LO	QA	Y	149.0
EU045	EUROPEAN JOURNAL OF BIOCHEMIST	QH	Y	256.0
IN230	INTERDISCIPLINARY SCIENCE REVI	Q	Y	317.0
EN130	ENVIRONMENTAL SCIENCE AND TECH	T	Y	258.0
JO602	JOURNAL OF THEORETICAL BIOLOGY	QH	Y	272.0
OE005	OECOLOGIA: BERLIN	GC	Y	203.0
LI015	LIFE SCIENCES: NEW YORK.	QH	Y	284.0
ZZ331	OCEANIC ABSTRACTS: LA JOLLA	Z	Y	280.0

total

T USE	COUNT	T PERCENT %	C PERCENT %
3,678.0	1.0	3.196927 %	3.384481 %
2,368.0	1.0	2.058271 %	1.968713 %
1,681.0	1.0	1.461129 %	1.330523 %
1,517.0	1.0	1.318580 %	1.495254 %
1,267.0	1.0	1.101279 %	0.990692 %
1,146.0	1.0	0.996106 %	0.986084 %
1,131.0	1.0	0.983068 %	0.700396 %
1,091.0	1.0	0.948300 %	0.749931 %
1,044.0	1.0	0.907447 %	0.805225 %
1,014.0	1.0	0.881371 %	0.340982 %
1,000.0	1.0	0.869202 %	1.171968 %
975.0	1.0	0.847472 %	1.123168 %
935.0	1.0	0.812704 %	0.543729 %
920.0	1.0	0.799666 %	0.693484 %
812.0	1.0	0.705792 %	0.708460 %
793.0	1.0	0.689278 %	0.792554 %
773.0	1.0	0.671893 %	0.582896 %
719.0	1.0	0.624957 %	0.630126 %
700.0	1.0	0.608442 %	0.570224 %
696.0	1.0	0.604965 %	0.794858 %
692.0	1.0	0.601488 %	0.642798 %
654.0	1.0	0.568458 %	0.714220 %
624.0	1.0	0.542382 %	0.708460 %
612.0	1.0	0.531952 %	0.273016 %
569.0	1.0	0.494576 %	0.443508 %
564.0	1.0	0.490230 %	0.465395 %
559.0	1.0	0.485884 %	0.605935 %
559.0	1.0	0.485884 %	0.618607 %
528.0	1.0	0.458939 %	0.475763 %
498.0	1.0	0.432863 %	0.494194 %
476.0	1.0	0.413740 %	0.419316 %
465.0	1.0	0.404179 %	0.266105 %
458.0	1.0	0.398095 %	0.228079 %
454.0	1.0	0.394618 %	0.360566 %
452.0	1.0	0.392879 %	0.520689 %
438.0	1.0	0.380711 %	0.279928 %
433.0	1.0	0.376365 %	0.391669 %
422.0	1.0	0.366803 %	0.315639 %
421.0	1.0	0.365934 %	0.383605 %
413.0	1.0	0.358981 %	0.400885 %
408.0	1.0	0.354635 %	0.407797 %
407.0	1.0	0.353765 %	0.251129 %
406.0	1.0	0.352896 %	0.361718 %
401.0	1.0	0.348550 %	0.362870 %
399.0	1.0	0.346812 %	0.459635 %
394.0	1.0	0.342466 %	0.232697 %
392.0	1.0	0.340727 %	0.286840 %
382.0	1.0	0.332035 %	0.306423 %
381.0	1.0	0.331166 %	0.323703 %
377.0	1.0	0.327689 %	0.251129 %
370.0	1.0	0.321605 %	0.426228 %
369.0	1.0	0.320736 %	0.316791 %
365.0	1.0	0.317259 %	0.420468 %
362.0	1.0	0.314651 %	0.251129 %
356.0	1.0	0.309436 %	0.410100 %
354.0	1.0	0.307698 %	0.314487 %
348.0	1.0	0.302482 %	0.400885 %
339.0	1.0	0.294660 %	0.240761 %
337.0	1.0	0.292921 %	0.171643 %
332.0	1.0	0.288575 %	0.294904 %
317.0	1.0	0.275537 %	0.365174 %
311.0	1.0	0.270322 %	0.297208 %
307.0	1.0	0.266845 %	0.313335 %
305.0	1.0	0.265107 %	0.233849 %
304.0	1.0	0.264238 %	0.327159 %
303.0	1.0	0.263368 %	0.322551 %

MARINE BIOLOGICAL LABORATORY

JOURNALS USED 100 X'S OR MORE

10/16/84

SERIAL USE

ID	Partial Title	LC	STATUS	CUR USE
MA180	MARINE POLLUTION BULLETIN: LON	QH	Y	242.0
JO148	JOURNAL OF CHROMATOGRAPHY: AMS	QD	Y	244.0
TR252	TRENDS IN BIOCHEMICAL SCIENCES	QP	Y	276.0
HY005	HYDROBIOLOGIA: THE HAGUE	QH	Y	259.0
JO406	JOURNAL OF MORPHOLOGY: PHILADE	QH	Y	190.0
JO498	JOURNAL OF PHYSICS: LONDON.	QC	Y	282.0
JO420	JOURNAL OF NEUROCHEMISTRY: LON	QP	Y	194.0
JO292	JOURNAL OF HISTOCHEMISTRY AND	QH	Y	219.0
UN070	UNITED STATES DEPARTMENT OF TH	QE	Y	128.0
MA080	MARINE CHEMISTRY: AMSTERDAM	QC	Y	210.0
AP030	AMERICAN ASSOCIATION OF PETROL	QE	Y	124.0
AP010	APPLIED AND ENVIRONMENTAL MICR	QR	Y	173.0
EN115	ENVIRONMENTAL MONITORING AND A	QH	Y	264.0
JO218	JOURNAL OF EXPERIMENTAL BIOLOG	QH	Y	99.0
EX001	EXPERIENTIA: BASEL.	Q	Y	214.0
BI405	BIOSCIENCE 1951: WASHINGTON	QH	Y	217.0
CA175	CANADIAN JOURNAL OF ZOOLOGY 19	QL	Y	178.0
BU650	BULLETIN OF MARINE SCIENCE 195	QH	Y	159.0
ME890	METHODS IN ENZYMOLOGY: NEW YOR	QP	Y	136.0
AN145	ANALYTICAL CHEMISTRY 1929: AME	QD	Y	129.0
JO030	JOURNAL OF THE AMERICAN CHEMIC	QD	Y	111.0
DI020	DISCOVER 1980: NEW YORK	Q	Y	241.0
JO116	JOURNAL OF CELL SCIENCE: LONDO	QH	Y	118.0
JO494	JOURNAL OF PHYSICAL OCEANOGRAP	GC	Y	170.0
NA150	NATURAL HISTORY: NEW YORK	QH	Y	232.0
ZZ065	AQUATIC SCIENCES AND FISHERIES	QH	Y	193.0
JO614	JOURNAL OF ULTRSTRUCTURE RESEA	QH	Y	165.0
EC010	ECOLOGICAL MODELLING: THE METH	QH	Y	219.0
EC025	ECOLOGY:	QH	Y	126.0
MA075	MARINE BIOLOGY LETTERS: AMSTER	QH	Y	231.0
AR295	ARCHIVES OF MICROBIOLOGY 1930:	QR	Y	166.0
PL010	PLANT PHYSIOLOGY: LANCASTER, P	QK	Y	168.0
TR254	TRENDS IN NEUROSCIENCES: CAMBR	QP	Y	207.0
JO258	JOURNAL OF GENERAL MICROBIOLOG	QR	Y	123.0
AR130	ARCHIV FUR HYDROBIOLOGIE; ORGA	QH	Y	181.0
GE170	GEOLOGICAL SOCIETY OF AMERICA	QE	Y	64.0
PL040	PLANTA; ARCHIV FUR WISSENSCHAF	QK	Y	186.0
ZZ297	JOURNAL OF THE AMERICAN MEDICA	R	Y	191.0
AM160	AMERICAN JOURNAL OF PHYSIOLOGY	QP	Y	128.0
LO001	SOS; TRANSACTIONS, AMERICAN GE	QE	Y	186.0
MA090	MARINE ENVIRONMENTAL RESEARCH:	GC	Y	207.0
JO514	JOURNAL OF PLANKTON RESEARCH:	QH	Y	199.0
PF005	PFLUGERS ARCHIV; EUROPEAN JOUR	QP	Y	140.0
IN480	INTERNATIONAL REVIEW OF CYTOLO	QH	Y	143.0
MA110	MARINE GEOLOGY: AMSTERDAM	QE	Y	139.0
IN235	INTERDOK, DIRECTORY OF PUBLISH	G	Y	200.0
ES005	ESTUARIES: SOLOMONS	QH	Y	181.0
MO035	MOLECULAR AND GENERAL GENETICS	QH	Y	192.0
NE070	NEUROSCIENCE: NEW YORK	QP	Y	176.0
FE010	FEDERATION PROCEEDINGS:	QH	Y	154.0
AR225	ARCHIVES OF BIOCHEMISTRY AND B	QP	Y	123.0
OI001	OIKOS: COPENHAGEN.	QH	Y	165.0
BU550	BULLETIN OF THE JAPANESE SOCIE	S	Y	131.0
CH005	CHEMICAL AND ENGINEERING NEWS	QD	Y	188.0
GE290	GEOPHYSICAL JOURNAL OF THE ROY	QC	Y	143.0
DE080	DEVELOPMENT, GROWTH AND DIFFER	QH	Y	157.0
CA195	CANCER 1948: NEW YORK	R	Y	122.0
JO244	JOURNAL OF FISH BIOLOGY: LONDO	QL	Y	161.0
CR025	CRUSTACEANA 1960: LEIDEN	QL	Y	117.0
AM265	AMERICAN ZOOLOGIST 1961: AMERI	QL	Y	85.0
JO120	JOURNAL OF CELLULAR PHYSIOLOGY	QP	Y	121.0
AP020	APPLIED OPTICS 1962: NEW YORK	QC	Y	159.0
EL010	ELECTRONICS: NEW YORK.	T	Y	165.0
JO086	JOURNAL OF BIOCHEMISTRY: TOKYO	QH	Y	132.0
MA335	MATHEMATICAL PROCEEDINGS OF TH	QA	Y	166.0
SM001	SMITHSONIAN: WASHINGTON, D.C.	Q	Y	174.0

T USE	COUNT	T PERCENT %	C PERCENT %
299.0	1.0	0.259892 %	0.278776 %
294.0	1.0	0.255546 %	0.28106[illegible] %
293.0	1.0	0.254676 %	0.317943 %
291.0	1.0	0.252938 %	0.298360 %
290.0	1.0	0.252069 %	0.210874 %
288.0	1.0	0.250330 %	0.324955 %
284.0	1.0	0.246853 %	0.223482 %
273.0	1.0	0.237292 %	0.252281 %
269.0	1.0	0.233815 %	0.147452 %
268.0	1.0	0.232946 %	0.241913 %
264.0	1.0	0.229469 %	0.142844 %
264.0	1.0	0.229469 %	0.199290 %
264.0	1.0	0.229469 %	0.304119 %
264.0	1.0	0.229469 %	0.114045 %
262.0	1.0	0.227731 %	0.246521 %
258.0	1.0	0.224254 %	0.249977 %
255.0	1.0	0.221647 %	0.205050 %
253.0	1.0	0.219908 %	0.182011 %
251.0	1.0	0.218170 %	0.156668 %
250.0	1.0	0.217301 %	0.148604 %
247.0	1.0	0.214693 %	0.127868 %
241.0	1.0	0.209478 %	0.277624 %
240.0	1.0	0.208609 %	0.135932 %
238.0	1.0	0.206870 %	0.195834 %
238.0	1.0	0.206870 %	0.267256 %
237.0	1.0	0.206001 %	0.222330 %
233.0	1.0	0.202524 %	0.190075 %
232.0	1.0	0.201655 %	0.252281 %
232.0	1.0	0.201655 %	0.145148 %
231.0	1.0	0.200786 %	0.266105 %
225.0	1.0	0.195571 %	0.191227 %
225.0	1.0	0.195571 %	0.193531 %
220.0	1.0	0.191225 %	0.239457 %
219.0	1.0	0.190355 %	0.141692 %
217.0	1.0	0.188617 %	0.208506 %
216.0	1.0	0.187748 %	0.073726 %
215.0	1.0	0.186879 %	0.214266 %
215.0	1.0	0.186879 %	0.220026 %
212.0	1.0	0.184271 %	0.147452 %
212.0	1.0	0.184271 %	0.214266 %
211.0	1.0	0.183402 %	0.238457 %
210.0	1.0	0.182533 %	0.229242 %
204.0	1.0	0.177317 %	0.161275 %
202.0	1.0	0.175579 %	0.164731 %
202.0	1.0	0.175579 %	0.160123 %
200.0	1.0	0.173840 %	0.230394 %
199.0	1.0	0.172971 %	0.208506 %
199.0	1.0	0.172971 %	0.221178 %
197.0	1.0	0.171233 %	0.202746 %
196.0	1.0	0.170364 %	0.177403 %
196.0	1.0	0.169494 %	0.141692 %
192.0	1.0	0.166887 %	0.190075 %
191.0	1.0	0.166018 %	0.150908 %
190.0	1.0	0.165148 %	0.216570 %
190.0	1.0	0.165148 %	0.164731 %
189.0	1.0	0.163410 %	0.180859 %
186.0	1.0	0.161672 %	0.140540 %
182.0	1.0	0.158195 %	0.185467 %
180.0	1.0	0.156456 %	0.134780 %
178.0	1.0	0.154718 %	0.097917 %
175.0	1.0	0.153849 %	0.139388 %
174.0	1.0	0.152110 %	0.183163 %
174.0	1.0	0.152110 %	0.190075 %
174.0	1.0	0.152110 %	0.152060 %
174.0	1.0	0.152110 %	0.191227 %
174.0	1.0	0.152110 %	0.200442 %

MARINE BIOLOGICAL LABORATORY

10/16/84 JOURNALS USED 100 X'S OR MORE

SERIAL USE

ID	Partial Title	LC	STATUS	CUR USE
F[illegible]130	FISHERY BULLETIN OF THE FISH A	S	Y	72.0
G[illegible]30	GEOPHYSICAL RESEARCH LETTERS:	QC	Y	154.0
WI025	WILHELM ROUX'S ARCHIVES OF DEV	QL	Y	109.0
EN010	ENDOCRINOLOGY: PHILADELPHIA	QP	Y	103.0
OC147	OCEAN SCIENCE NEWS:	GC	Y	169.0
EC015	ECOLOGICAL MONOGRAPHS: ECOLOGI	QH	Y	98.0
JO020	JOURNAL OF THE ACOUSTICAL SOCI	QC	Y	88.0
AT010	ATMOSPHERIC ENVIRONMENT 1967:	QC	Y	140.0
BU085	BULLETIN OF ENVIRONMENTAL CONT	QH	Y	131.0
CA095	CANADIAN ENTOMOLOGIST 1868: TO	QL	Y	152.0
ZZ250	DISSERTATION ABSTRACTS INTERNA	Z	Y	99.0
CE025	CELL MOTILITY 1981: NEW YORK	QH	Y	161.0
EM001	EMBO JOURNAL: HEIDELBERG.	QH	Y	161.0
PR655	PROTOPLASMA: LEIPZIG	QH	Y	135.0
AN446	ANNALS OF THE NEW YORK ACADEMY	Q	Y	79.0
PH105	PHYSICAL REVIEW LETTERS:	QC	Y	140.0
JO004	JOURNAL OF BACTERIOLOGY: BALTI	QR	Y	132.0
TE055	TELLUS: STOCKHOLM.	QC	Y	111.0
WA045	WATER RESEARCH: NEW YORK.	T	Y	120.0
AM175	AMERICAN JOURNAL OF SCIENCE 18	Q	Y	90.0
JO426	JOURNAL OF NEUROPHYSIOLOGY: SP	QP	Y	95.0
JO408	JOURNAL OF PHYCOLOGY: NEW YORK	QK	Y	75.0
PH125	PHYSICS LETTERS: AMSTERDAM	QC	Y	146.0
JO310	JOURNAL OF IMMUNOLOGY: BALTIMO	QR	Y	135.0
JO526	JOURNAL OF PROTOZOOLOGY: NEW Y	QL	Y	65.0
CE010	CELL BIOLOGY: INTERNATIONAL RE	QH	Y	147.0
BO440	BOTANICA MARINA 1959: HAMBURG	QK	Y	129.0
GE240	GEOLOGY: BOULDER, COLORADO	QE	Y	118.0
TE050	TECTONOPHYSICS: AMSTERDAM.	QE	Y	121.0
TE075	TETRAHEDRON LETTERS: NEW YORK.	QD	Y	133.0
JO090	JOURNAL OF BIOGEOGRAPHY: OXFOR	G	Y	96.0
NA255	NAUNYN-SCHMIEDEBERGS ARCHIV FU	R	Y	29.0
DO040	DOKLADY AKADEMII NAUK SSSR (CO	Q	Y	130.0
JO249	JOURNAL OF THE FISHERIES RESEA	S	N	0.0
GE040	GENETICS: BROOKLYN	QH	Y	120.0
AU060	AUSTRALIAN JOURNAL OF MARINE A	QH	Y	120.0
MA060	MARINE BEHAVIOR AND PHYSIOLOGY	QL	Y	107.0
PU005	PUBBLICAZIONE DELLA STAZIONE Z	QL	Y	123.0
BI230	BIOLOGICAL REVIEWS OF THE CAMB	Q	Y	76.0
PR150	PROCEEDINGS OF THE AMERICAN SO	T	Y	108.0
JO118	JOURNAL OF CELLULAR BIOCHEMIST	QH	Y	118.0
EX020	EXPERIMENTAL EYE RESEARCH: NEW	QP	Y	128.0
NA220	NATURWISSENSCHAFTEN: BERLIN	QH	Y	112.0
BI290	BIOLOGY OF THE CELL 1962: PARI	QH	Y	123.0
AN608	ANNUAL REVIEW OF BIOCHEMISTRY	QP	Y	89.0
JO156	JOURNAL OF CLINICAL INVESTIGAT	R	Y	108.0
QU090	QUARTERLY REVIEW OF BIOLOGY: B	QH	Y	100.0
JO324	JOURNAL OF INSECT PHYSIOLOGY:	QL	Y	86.0
PH040	PHOTOCHEMISTRY AND PHOTOBIOLOG	QC	Y	126.0
EN125	ENVIRONMENTAL POLLUTION: ESSEX	QH	Y	107.0
JO080	JOURNAL OF THE ATMOSPHERIC SCI	QC	Y	84.0
JO128	JOURNAL OF CHEMICAL PHYSICS: N	QC	Y	99.0
JO272	JOURNAL OF GEOLOGY: UNIV. OF C	QE	Y	97.0
AQ015	AQUACULTURE MAGAZINE 1974: LIT	S	Y	122.0
EV001	EVOLUTION: LANCASTER	QH	Y	95.0
JO492	JOURNAL OF PHYSICAL CHEMISTRY:	QD	Y	104.0
JO418	JOURNAL OF NEUROBIOLOGY: NEW Y	QP	Y	115.0
EU050	EUROPEAN JOURNAL OF CELL BIOLO	QH	Y	126.0
OI005	OIL AND GAS JOURNAL: TULSA, OK	T	Y	117.0
JO580	JOURNAL OF SEDIMENTARY PETROLO	QE	Y	47.0
ZO055	ZOOLOGICAL RECORD: LONDON	QL	Y	2.0
AM005	AMBIO 1972: STOCKHOLM	Q	Y	94.0
TI040	TISSUE AND CELL: EDINBURGH.	QH	Y	95.0
AN135	ANALYTICA CHIMICA ACTA 1947: A	QD	Y	87.0
EX010	EXPERIMENTAL BRAIN RESEARCH: B	QP	Y	105.0
BR065	BRITISH MEDICAL JOURNAL 1857:	W	Y	114.0

T USE	COUNT	T PERCENT %	C PERCENT %
174.0	1.0	0.151241 %	0.082942 %
174.0	1.0	0.151241 %	0.177403 %
171.0	1.0	0.148634 %	0.125564 %
170.0	1.0	0.147764 %	0.118653 %
169.0	1.0	0.146895 %	0.194683 %
168.0	1.0	0.146026 %	0.112893 %
168.0	1.0	0.146026 %	0.101373 %
167.0	1.0	0.145157 %	0.161275 %
167.0	1.0	0.145157 %	0.150908 %
167.0	1.0	0.145157 %	0.175099 %
162.0	1.0	0.140811 %	0.114045 %
161.0	1.0	0.139942 %	0.185467 %
161.0	1.0	0.139942 %	0.185467 %
161.0	1.0	0.139942 %	0.155516 %
160.0	1.0	0.139072 %	0.091005 %
160.0	1.0	0.139072 %	0.161275 %
157.0	1.0	0.136465 %	0.152060 %
157.0	1.0	0.136465 %	0.127868 %
157.0	1.0	0.136465 %	0.138236 %
156.0	1.0	0.135596 %	0.103677 %
156.0	1.0	0.135596 %	0.109437 %
156.0	1.0	0.135596 %	0.060370 %
156.0	1.0	0.135596 %	0.168187 %
154.0	1.0	0.133857 %	0.155516 %
153.0	1.0	0.132988 %	0.074878 %
152.0	1.0	0.132119 %	0.169339 %
151.0	1.0	0.131250 %	0.148604 %
150.0	1.0	0.130380 %	0.135932 %
150.0	1.0	0.130380 %	0.139388 %
148.0	1.0	0.128642 %	0.153212 %
147.0	1.0	0.127773 %	0.110589 %
147.0	1.0	0.127773 %	0.033407 %
145.0	1.0	0.126034 %	0.149756 %
144.0	1.0	0.125165 %	0.000000 %
143.0	1.0	0.124296 %	0.138236 %
142.0	1.0	0.123427 %	0.138236 %
142.0	1.0	0.123427 %	0.123261 %
142.0	1.0	0.123427 %	0.141692 %
141.0	1.0	0.122558 %	0.087550 %
141.0	1.0	0.122558 %	0.124412 %
140.0	1.0	0.121688 %	0.135932 %
139.0	1.0	0.120819 %	0.147452 %
138.0	1.0	0.119950 %	0.129020 %
135.0	1.0	0.117342 %	0.141692 %
134.0	1.0	0.116473 %	0.102525 %
134.0	1.0	0.116473 %	0.124412 %
134.0	1.0	0.116473 %	0.115197 %
133.0	1.0	0.115604 %	0.099069 %
133.0	1.0	0.115604 %	0.145148 %
132.0	1.0	0.114735 %	0.123261 %
132.0	1.0	0.114735 %	0.096765 %
131.0	1.0	0.113866 %	0.114045 %
131.0	1.0	0.113866 %	0.111741 %
130.0	1.0	0.112996 %	0.140540 %
130.0	1.0	0.112996 %	0.109437 %
130.0	1.0	0.112996 %	0.115197 %
127.0	1.0	0.110127 %	0.132476 %
126.0	1.0	0.109520 %	0.145148 %
126.0	1.0	0.109520 %	0.134780 %
125.0	1.0	0.108650 %	0.054142 %
125.0	1.0	0.108650 %	0.002304 %
124.0	1.0	0.107781 %	0.108285 %
124.0	1.0	0.107781 %	0.109437 %
123.0	1.0	0.106912 %	0.100221 %
123.0	1.0	0.106912 %	0.120957 %
122.0	1.0	0.106043 %	0.131324 %

MARINE BIOLOGICAL LABORATORY

JOURNALS USED 100 X'S OR MORE

10/16/84

SERIAL USE

ID	Partial Title	LC	STATUS	CUR USE
VI035	VISION RESEARCH: OXFORD	QP	Y	91.0
PA130	PARASITOLOGY: CAMBRIDGE, ENGLA	QL	Y	82.0
TR045	TRANSACTIONS OF THE AMERICAN F	S	Y	61.0
AQ025	AQUATIC BOTANY 1975: THE METHE	QK	Y	102.0
JO345	JOURNAL OF LIPID RESEARCH: BET	QP	Y	82.0
OC190	OCEANOGRAPHY AND MARINE BIOLOG	GC	Y	20.0
AM245	AMERICAN SCIENTIST 1913: SIGMA	Q	Y	86.0
AN200	ANIMAL BEHAVIOUR 1953: LONDON	QL	Y	64.0
CO195	COMPUTER: NEW YORK	QA	Y	95.0
JO394	JOURNAL OF MICROSCOPY: LONDON.	QH	Y	99.0
JO407	JOURNAL OF MUSCLE RESEARCH AND	QP	Y	117.0
JO410	JOURNAL OF THE NATIONAL CANCER	R	Y	75.0
MO010	MOLECULAR AND BIOCHEMICAL PARA	QL	Y	117.0
SC190	SCIENCES (THE): NEW YORK	Q	Y	117.0
AM085	AMERICAN JOURNAL OF BOTANY 191	QK	Y	81.0
CA150	CANADIAN JOURNAL OF MICROBIOLO	QR	Y	80.0
GE010	GENERAL AND COMPARATIVE ENDOCR	QP	Y	69.0
PH185	PHYSIOLOGICAL REVIEWS: BALTIMO	QP	Y	97.0
CA120	CANADIAN JOURNAL OF BOTANY 192	QK	Y	76.0
IN390	INTERNATIONAL JOURNAL OF INVER	QL	Y	112.0
GE345	GEOPHYSICS:	QE	Y	76.0
JO430	JOURNAL OF NEUROSCIENCE METHOD	QP	Y	107.0
NE130	NEW PHYTOLOGIST: LONDON	QK	Y	90.0
PH215	PHYTOCHEMISTRY: LONDON	QK	Y	77.0
JO202	JOURNAL OF EMBRYOLOGY AND EXPE	QH	Y	70.0
JO636	JOURNAL OF ZOOLOGY: LONDON.	QL	Y	96.0
PH120	PHYSICS OF FLUIDS: NEW YORK	QC	Y	74.0
AQ035	AQUATIC TOXICOLOGY 1981: AMSTE	QH	Y	111.0
PH100	PHYSICAL REVIEW: NEW YORK	QC	Y	87.0
CH070	CHEMOSPHERE 1973: NEW YORK	QH	Y	103.0
CH125	CHROMOSOMA 1939: BERLIN	QH	Y	81.0
MO025	MOLECULAR AND CELLULAR BIOLOGY	QH	Y	110.0
MO020	MOLECULAR AND CELLULAR BIOCHEM	QH	Y	104.0
MU005	MUTATION RESEARCH: AMSTERDAM	QH	Y	102.0
PL025	PLANT AND SOIL: THE HAGUE	QK	Y	79.0
SO015	SOIL SCIENCE: BALTIMORE.	S	Y	83.0
JO626	JOURNAL OF THE WATER POLLUTION	T	Y	63.0
DI001	DIABETES 1952: NEW YORK	R	Y	83.0
GA005	GAMETE RESEARCH: NEW YORK	QH	Y	97.0
JO224	JOURNAL OF EXPERIMENTAL MEDICI	R	Y	88.0
AN155	ANATOMICAL RECORD 1906: PHILAD	QM	Y	72.0
CH010	CHEMICAL GEOLOGY 1966: AMSTERD	QE	Y	87.0
JO466	JOURNAL OF PARASITIOLOGY: URBA	QL	Y	32.0
BL001	BLOOD 1946: NEW YORK	QP	Y	96.0
DI015	DIFFERENTIATION 1973: LONDON	QH	Y	100.0
OC200	OCEANOLOGIA: WARSAW	GC	Y	92.0
OC215	OCEANOLOGICA ACTA: PARIS	GC	Y	87.0
RE650	REVIEWS OF GEOPHYSICS AND SPAC	QC	Y	64.0
CU040	CURRENT MICROBIOLOGY 1978: NEW	QR	Y	102.0
CO540	CORAL REEFS 1982: NEW YORK	QH	Y	101.0
JO146	JOURNAL OF CHROMATOGRAPHIC SCI	QD	Y	86.0
CO165	COMPTES RENDUS HEBDOMADAIRES D	Q	N	0.0
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T USE	COUNT	T PERCENT %	C PERCENT %
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120.0	1.0	0.104304 %	0.117501 %
120.0	1.0	0.104304 %	0.094461 %
120.0	1.0	0.104304 %	0.023039 %
118.0	1.0	0.102566 %	0.099069 %
118.0	1.0	0.102566 %	0.073726 %
118.0	1.0	0.102566 %	0.109437 %
117.0	1.0	0.101697 %	0.114045 %
117.0	1.0	0.101697 %	0.134780 %
117.0	1.0	0.101697 %	0.086398 %
117.0	1.0	0.101697 %	0.134780 %
117.0	1.0	0.101697 %	0.134780 %
116.0	1.0	0.100827 %	0.093309 %
116.0	1.0	0.100827 %	0.092157 %
115.0	1.0	0.099958 %	0.079486 %
115.0	1.0	0.099958 %	0.111741 %
114.0	1.0	0.099089 %	0.087550 %
114.0	1.0	0.099089 %	0.129020 %
113.0	1.0	0.098220 %	0.087550 %
113.0	1.0	0.098220 %	0.123261 %
113.0	1.0	0.098220 %	0.103677 %
113.0	1.0	0.098220 %	0.088702 %
112.0	1.0	0.097351 %	0.080438 %
112.0	1.0	0.097351 %	0.110589 %
112.0	1.0	0.097351 %	0.085246 %
111.0	1.0	0.096481 %	0.127868 %
111.0	1.0	0.096481 %	0.100221 %
110.0	1.0	0.095612 %	0.118653 %
110.0	1.0	0.095612 %	0.093309 %
110.0	1.0	0.095612 %	0.126716 %
109.0	1.0	0.094743 %	0.119805 %
109.0	1.0	0.094743 %	0.117501 %
109.0	1.0	0.094743 %	0.091005 %
109.0	1.0	0.094743 %	0.095613 %
108.0	1.0	0.093874 %	0.072574 %
107.0	1.0	0.093005 %	0.095613 %
107.0	1.0	0.093005 %	0.111741 %
107.0	1.0	0.093005 %	0.101373 %
106.0	1.0	0.092135 %	0.082942 %
106.0	1.0	0.092135 %	0.100221 %
105.0	1.0	0.091266 %	0.036863 %
104.0	1.0	0.090397 %	0.110589 %
103.0	1.0	0.089528 %	0.115197 %
103.0	1.0	0.089528 %	0.105981 %
103.0	1.0	0.089528 %	0.100221 %
103.0	1.0	0.089528 %	0.073726 %
102.0	1.0	0.088659 %	0.117501 %
101.0	1.0	0.087789 %	0.116349 %
101.0	1.0	0.087789 %	0.099069 %
100.0	1.0	0.086920 %	0.000000 %
74,225.0	250.0	64.516547	64.103544

ACCESSING DIALOG USING YOUR OWN MICRO OR USING PUBLIC ACCESS SERVICES

Janice Sieburth, Reference/Bibliographer
University of Rhode Island, Kingston

It's been only about ten years since online database searching has become a part of reference work in most libraries. Reference librarians have studied extensively to perform the intermediary role between the person who needs information and the vendor who produces the databases. Experience using indexes, accessing library resources, negotiating reference questions, operating computers and coping with the intricacies of databases contribute to the skillfulness of the online searcher. These skills must be maintained through regular practice, continued training in database contents and search techniques, and keeping up to date with developments in the field.

As microcomputers proliferate and individuals learn to do their own searching, librarians will be particularly needed as knowledgeable consultants. For complex and comprehensive searches the best, most cost-effective results will be obtained through the combined efforts of the skilled and experienced librarian and the subject knowledge of the scientist, engineer or business person.

The need for information in a field covering such a broad scope as marine sciences and services can best be served by utilizing a variety of databases to extend the resources of the library, to find a specific bit of data not easily secured from a printed source and to provide a timely individualized service.

Online searching has become an integral part of reference service in all large libraries and in most small specialized libraries as well. Like using copy machines it is difficult to remember how we handled in-depth information retrieval before we could feed our keywords into a terminal and print out a biblio-

graphy for a library patron on their specific subject of interest. Certainly there are marine science librarians who when asked for particular information know the exact bit of data in a journal article or report precisely pertinent to the topic. Possibly in most cases time can be taken to search out a bibliography using a printed index or key paper on the subject. However, even the most diligent librarian cannot come up with the comprehensiveness or the most up-to-date information that is possible to retrieve quickly online. On the other hand, there are still some subjects, often historical or general, for which a database search is not appropriate or would not retrieve a manageable or comprehensive amount of information. These still need an individual's time with printed resources.

In a large general university or research library there isn't time to give extensive personal help to a patron. Usually it's "Try this index, or this handbook," and we take up the next question. With online searching we can offer individualized service - a one-to-one consultation with the researcher, engineer, businessman or student writing a term paper.

In order to manage this additional reference service, we have gone to workshops, training sessions, update sessions, online users programs and now we not only feel pretty comfortable sitting in front of a computer terminal, but also probably know much more about the indexes we have used in paper form for many more years. We've purchased vendor manuals by the shelf-full, thesauri, database manuals, outlines of concept codes and journal lists. We are gratified when the person we are helping says "Wow! That's just what I wanted!" and we deplore the fact that there are so many people who could utilize our help and/or

a database search and don't know about them or can't afford it. It's true that for the first time for many of us, we are charging a fee for service, an alarming trend for many librarians.

At the University of Rhode Island almost exactly ten years ago, two of our reference librarians received their first training in this bewilderingly complex business of computers and information retrieval. One of them, Carol Winn, later moved on to become a marine science librarian managing another information retrieval operation here at Woods Hole. Who would have dreamed ten years ago that we would by this time have some 200 databases to choose from, half a dozen online vendors marketing them and microcomputers everywhere we look with the potential of going online. In those ten years not only do we have more databases to choose from, but the original group we learned on is still there, multiplied in size, with more search languages and more choices - bibliographic files, encyclopedia files, full text files, data files and directory files. Access points have increased and if all this is not enough, we can choose to scan the databases, save a search, sort and print or type in a variety of formats, and if we stop to think about the procedure it's costing us money. At the same time we certainly have friendlier systems, more reliable computers and terminals (usually), faster speeds, better manuals and more people to consult when help is needed. Even our own patrons can give us advice about techniques after searching at home.

The variety and depth of database files offered by online vendors have given us access to resources that restrictive budgets have kept out of reach for us in print form. Find-

ing a list of articles is no longer a problem even though tracking down the documents is something else. Even here computers have opened the door to more efficient interlibrary loans or the purchase of documents difficult to find and borrow.

Now, for those who are not searchers, why would you do an online search and what questions can be answered? First, an online search will cost you money, but it will save you time. It may provide a source of information that could not be found any other way and it is usually more up-to-date. Second, examples of some specific questions that we've grappled with are:

-- What measures have been used to control vandalism in marinas?
-- What work has been done on composite fish products using crab or lobster?
-- Are there any recent publications on artificial reefs?
-- What is the market potential for squid and what can I find out about processing and handling it?
-- Can you produce a mailing list of companies on the west coast that are ship repair yards?
-- Has a patent been issued on a process for better flavor retention in frozen fish?

Where can an individual have a search done? Many public libraries, academic libraries at state institutions and some state libraries offer online searching to the public. Even the smallest public library can usually channel a search request to an associated facility.

What does it cost? Sometimes searches are free. This may be true at a small college with limited resources where students with appropriate topics can receive a limited list of references or at a state library where sear-

ches may be offered to citizens of the state to help compensate for the lack of library services in a sparsely populated area. The Maine State Library, for instance, calls their service Talimaine and it is available directly or through a public library. In other cases, there may be a surcharge to help pay the cost of the librarian's time, the terminal and telephone fees, and this is added to the online charge. An example is the Providence Public Library where the surcharge is about $10. There are many variations of the way fees are calculated from a flat rate to a complicated scale of charges.

At the University of Rhode Island we have continued the system first worked out by NASIC (Northeast Academic Science Information Center), a federally funded project which sponsored and supported the introduction of online searching into New England in the mid-1970's. We have calculated a charge per minute of computer connect time for each database that would cover the fee of the most expensive vendor with which we have a contract. This is then the rate regardless of the source of the database. Royalty fees for typing or printing citations are added to the minute charge. We are subsidizing one-third of the connect time for the campus community and charging one and one-half that amount for most others. This nominal charge has resulted in searches that average $24 for our academic users with a range from $2 to several hundred dollars per search.

At the University of Rhode Island Library our search service is called URICA for URI Computer Access and our terminals are situated in a small room with partial walls within sight of the reference desk. All of the reference librarians have had extensive training

in online retrieval and each is responsible for searches in their area of subject expertise. Appointments are made for searches and at that time the requester sits down with us, we review the topic with them, organize the search strategy, select the databases and do the search. As we have gotten more experience and more searches we neither have the time nor the need to spend on extensive preparation. We are learning that a complex or comprehensive search may best be done in several sessions with the patron reviewing the first results before proceeding further.

Support by the library administration allows us discretion in doing a quick search to answer a reference question, verify interlibrary loans and give demonstrations for classes. Most senior level and graduate classes coming into the library for instruction on library resources are given an online demonstration along with directions for using the corresponding paper index. We feel that students should know about our search service and this in turn will make them aware of information systems available to them at home and on their future jobs.

Now, should we expect that there will be an overall change in the online searching by librarians resulting from the multitude of microcomputers that are appearing around us and the promotion of friendly systems and lower rates during off-peak hours? Will individuals do their literature searching at home, on the lab bench or their desks at work? A recent ad for a "black jack," a computer connection that can be screwed into the telephone handset to replace the mouthpiece, made me imagine someone on the highway stopping at a pay phone to dial up a database with a question. I think that changes will take place, but only gradually. One different aspect may be that we must

serve as consultants to those searching with micros. I recently happened to meet an individual from a nearby company who had frequently come in for a search on microchip technology. He explained that the company had gotten a Dialog contract and a micro, and two people were searching. The trouble was that they had spent a lot of money and still did not know what they were doing. He had suggested that they come to the library for help and advice. With our investment in manuals, paper indexes and experience we can certainly contribute assistance to this group of searchers.

Some individuals who use their computers all the time for a variety of functions will be delighted to find that they can retrieve information on most any topic and they will not care if it is comprehensive or totally pertinent. A few others have never felt satisfied with a librarian between them and the information they want. The most successful amateur searchers, however, will be that small group of faithful library users who come to the library to read journals, peruse the printed indexes and who are familiar with the primary literature of their field. For this group a micro will offer a logical extension of their use of printed material.

Librarians also have micros available to them, and decisions must be made about the best use of them. Do we want some interface software which will simplify or standardize search languages and reduce the connect time for transmission of a complex search? Will this increase the efficiency or will it slow down an experienced searcher and hinder the interactive capabilities? Do we want to download search results on a disc? This service may be requested by those researchers who

maintain files of literature in their area of specialization and wish to receive library output in electronic form.

A few public libraries are making micros available for anyone to use, and are contracting with a vendor to allow patrons to do their own searching at reduced evening rates. This has had some success, but early reports indicate that security of passwords, an adequate charging system, and some way to keep an individual from monopolizing the computer are important factors to consider. Better manuals were another concern so librarians would not have to spend so much time helping and answering questions. BRS also reports that their After Dark equivalent to the Knowledge Index is being used as a low-cost supplement to the traditional online services for demonstrations, staff practice and occasional regular searches.

One trend by vendors may be to target certain user groups. A service called "Colleague" by BRS caters to doctors with friendly software to help search the medical literature and even full text medical books. Other vendors offer businessmen, who can use the micro on their desk, financial data or stock quotations or the latest full text articles in the Harvard Business Review. Even farmers can call up various databases for pertinent commodity and market prices; electronic trading of such items as eggs, lambs, cotton or pigs; USDA reports; and information on crops, pesticides and farm management. A micro on a desk, a dock or the bridge next to the chart table should also be able to dial up the nearest communications network for databases with information on fish market prices, the latest underwater equipment, coastal zone regulations or information on steel deterioration on off-shore platforms.

As full text of journals and books become

generally available and this is combined with the next generation of intelligent computers, librarians may indeed be replaced in their role as intermediaries. In the meantime, we may be appreciated more than ever as database consultants and in-depth searchers. We must, however, combine a real knowledge of literature with all the latest computer capabilities in order to continue to provide competent and efficient information retrieval for our library communities.

THE ART OF INFORMATION MANAGEMENT

Frank C. Shephard, Editor
Oceanographic Literature Review

The amount of primary information published or otherwise available can be expected to continue to grow at rates which pose formidable challenges to its management. Many new technologies either currently or soon to be available can facilitate this task, but will require imaginative exploration of their utility. The main problems of information management are no longer technical per se, but organizational, conceptual, even cognitive and linguistic. The traditional conceptual bases of literature organization - cataloging, indexing, classifying and so on - may well yield to more flexible, 'customizable' and multifaceted approaches. Likewise, traditional services and products may yield, or at least give ground, to innovative services and products yet to be thought of, but made possible by the new technologies. Some of Eugene Garfield's products are illustrative of the possibilities. Many of the new applications are likely to emanate from librarians and other information managers, rather than from computer scientists and engineers. It is the former groups who are frustrated on a daily basis in trying to serve their users efficiently. In any event, information science has truly come of age, with exciting multidisciplinary developments on both theoretical and applied fronts. It is a profession with a bright and demanding future, bright because of the technical possibilities; demanding because scholarship, good judgment and experience will always be required to best serve the user.

INTRODUCTION

I appreciate the invitation to speak before this group. Most of us, including me, are so bound up in the day-to-day detail of our jobs that we rarely enjoy the luxury of reflecting on the underpinnings and implications

of what we do. But having to speak converts such reflection from luxury to obligation, and that is why I am grateful - this half-hour talk has forced some 50 or 60 hours of reading on me which should have been done long ago.

I'd like to start where Paul Gross left off yesterday. He issued a challenge to the information community: the scientists, he said, were preoccupied with their own work; even though aware that the information problem is acute, they would not solve it themselves. Could we solve it, Gross wanted to know.

The answer is yes. From initial obscurity, our roles have been pushed into the limelight by historical and contemporary forces. The mechanisms of information management and dissemination are now bottlenecks in society's absorption of knowledge. But we, the information managers, are the only ones looking at the whole picture and thus are ideally positioned to solve these problems, which mainly have to do with the rate at which information can flow socially and the means of targeting it accurately. Ten or fifteen years ago we were enthralled by recent developments in on-line capabilities largely having to do with the advent of random access storage media. Today it is possible that the very people at this meeting have access to more database terminals than existed nationwide when IAMSLIC was first established. But on-line databases, for all their utility, were simply not the panacea they were said to be. Once the technological problems were solved (and, to the extent they have not been, soon will be) a new set of difficult problems emerged which transcend technology, but which we must now address. The general dilemma may be articulated this way:

> The modern age has a false sense of superiority because of the great mass

> of data at its disposal, but the valid criterion of distinction is rather the extent to which man knows how to form and master the material at his command.

While this could have been written yesterday or tomorrow it is an 1810 quote from Johaan von Goethe who as I'm sure you know was no slouch in the information business and a scientist as well as a man of letters. So, with that as introduction, we can talk a little bit about information, its management, and ourselves, its managers.

INFORMATION

First, what is information? Let's start with an important philosophical definition: information is the substance which makes society an organism; otherwise we are just so many billion isolated cells with all the limitations which that implies. It is also - of all the resources at our disposal - the one with the most leverage. That is why they say that information is power. So if you feel your work is unappreciated remind yourself that what you handle is more precious than diamonds.

There are, of course, other definitions. The Bureau of Labor Statistics defines information in such a way that 1 of every 2 people in the work force is in its industry. This appears to include entertainers, e.g., me and Dolly Parton - a distinction that I personally have no trouble making.

To us, however, as a practical matter information refers to the published record of society's doings and thinkings, particularly (for this group) in science and technology. Those who manage any aspect of it only number in a few tens of thousands, not a few tens of

millions. This small group of us is charged with massaging that published record. We identify its elements, document them, and somehow get them to the people who need them. Here for your information are a few dimensions of the task which I've come across in recent reading:

- 15,000 books/year (in science and technology alone)
- 30,000 journals and serials currently published (in science and technology alone)
  - 60 million pages per year
  - 400 thousand articles per year (science and technology, U.S. alone)
  - 250 million readings of these per year
- 1500 abstract or index publications (in English alone)
- 4-5 million computer searches per year (expected by 1985)

INFORMATION MANAGEMENT

Remember that the main tasks of information management are to take that mass of information I just itemized, identify and document its elements, organize its subsets, and call those subsets to the attention of various subsets of users. These jobs are to my mind still more art than science (which is why I entitled my talk as I did). There will always be a strong scholarly component to information management, regardless of its high-tech tools. Yesterday's appropriate grouping of information is not tomorrow's. Yesterday's subsets of users are not tomorrow's. And yesterday's classification schedule and index terms are not tomorrow's. Even so, there are some general concepts that are likely to aid the information management art. There is not time to fully discuss these concepts or their ramifications, and

I wouldn't expect everyone to agree with them, at least as they are stated. Nevertheless, they may stimulate your thinking as they have mine.

(1) Information is best considered a natural resource, perhaps the resource which humans make available to the planet Earth the way plants make oxygen available. I prefer to call it a 'natural' resource in order to emphasize that it is generated everywhere, occurs in such profusion and bulk, and can be put to so many diverse uses that it will probably always defy any single universal scheme for its management. The "crisis" behind the so-called "information explosion," for example, is not new at all. It has always been a chronic problem for the individual. Even before the time of Gutenberg there was more information available than anyone could possibly absorb. Editing, reducing, and summarizing this unmanageable bulk is the job of educators and other cultural translators and interpreters. Indeed, it is a group activity in which all humans participate. And (to iterate again) the universal documentation of all the pieces does not, in itself, help much in the reduction process. Indeed, the more universal and comprehensive a subset of information becomes, the less relevant it will be for any individual user - and the more poorly organized.

(2) Information in its natural state is too diffuse to be usable. It must be refined and concentrated the way other natural resources are refined and concentrated. In the process, value is added to the pieces so collected, and the collection itself has a value which previously didn't exist at all.

(3) The main mechanisms of adding value to information can loosely be described as reduction tasks (textbooks, review articles,

and summaries are all associated with reducing what must be examined in order to eventually know something), and channelization tasks which involve aggregating, re-sorting, and re-distributing information. Selecting, collecting, cataloging, classifying, indexing and alerting activities, for example, fall largely in the area of channelization.

Most of these tasks we describe as the activity of "documentation." A book is a document, but it has associated with it a body of documentation. Representations of the document within the documentation are sometimes called surrogates. An abstract, e.g., is a surrogate for the original document, as are a set of index terms which describe the document. The purpose of the documentation, of course, is to increase awareness of the original document's existence and availability.

(4) The most promising organizational means for accomplishing these tasks are via nested (hierarchical) schemes and systems. For example, the task of documentation involves "sending" a document (via surrogates) into realms larger than itself (a discipline and a subdiscipline or two) and realms smaller than itself (its abstract, its title, its set of index terms). But note that while we all agree a discipline is "larger" than a document which it subsumes and an index term "smaller" than the document from which it came, the index term provides entree to moving up or down other nested systems (via the narrower and broader terms of the indexing metalanguage) which may either parallel or cut across the first scheme, and which exist in great numbers.

(5) The possible nested schemes which pertain to a given document are innumerable and not mutually exclusive.

Because the ways in which information can

be organized are innumerable there is no point in one institution attempting to organize it in all possible ways, any more than there is in finding one universal way. Even so, we should be able to use our computer technology to liberate us from the physical constraints of our actual documents. At the moment our documentation products are too often like horseless carriages. We employ a new technology but the products are the same old-fashioned ones. We still, e.g., catalog a book within the framework of only one scheme, and then assign it a unique number within the scheme. Why must we stick to one scheme and why must the book have only one number? Why not as many schemes as may be helpful to some group of users which we serve, and why not as many classification designations as make sense? Why, e.g., must a book on natural resources law be filed either with natural resources or with law rather than with both? The physical record - the book itself - must still be filed in only one way, but why not by date of acquisition, or alphabetically by author? Then, any number of surrogate 'logical' records of the book can exist side-by-side and simultaneously. The user may object that he can no longer browse, but was he that well served by browsing when segments of interest to him were widely separated anyway, perhaps without his knowledge? Today, he could be browsing document surrogates such as abstracts, tables-of-contents, whatever - pulled off the computer. Such surrogates need not be so blandly alphanumeric either. Facsimile devices should, and no doubt will, allow sampling the graphic and typographic characteristics of the book as well. Naturally, we're getting far ahead

of our own story - too far, in fact, into the vision of the bookless library. Long before that day comes we have to organize our information more flexibly, map it in more than one dimension, and find ways to successfully permit multifaceted, multileveled searches of it. Before we are finished, we must draw on much more than computer and software engineering. Our answers must be teased out of linguistics, psychology, sociology, general systems and operations research and even epistemology which, like linguistics before it, is coming to have applications. In the process, we are beginning to define an information science which you're sure to realize is under-represented and poorly organized (in the context of the growing scope of the field) by either Dewey or Library of Congress, illustrating the constraints of the rigid schemes to date.

INFORMATION MANAGERS

In spite of the talk about the paperless society I don't think the local library is about to become a thing of the past. There are sound political and managerial reasons for numerous redundant and widely dispersed repositories and information facilities. To the extent that publishing goes the paperless route, we must insist on widely and redundantly distributed paperless media. I haven't time to discuss this further now, but because we know so well that information is power we ought to be the last to permit centralization of its storage or distribution facilities.

Still, the role of the library is clearly changing, even as the library has fallen on hard times. How these factors should be handled is discussed more by yourselves

than by me, but because of the general and increasing flux in the ways information is handled and distributed, and because of the new sense of what an information manager is, the time is ripe to seize some initiatives for yourselves. In point of fact, you already have been doing so: look, e.g., at OCLC. And the points I'm about to make you have no doubt heard, read, and acted on before. Nevertheless, to reiterate briefly:

(1) New products and new services can lead to new income, but the initiative in developing them must come from within the information community.

(2) Beyond every special library's sponsoring clientele is a distant clientele. The publishing of documentation literature (like indices and catalogs) for special collections may, in itself, be a direct source of revenue, as can republication of special collections on microfilm. But it can also increase the library's use, thus its profile, and ultimately its budget. I think, e.g., of Mary Jane Beardsley's (URI-ICMRD) collection on artisanal fisheries and on how useful that facility is to areas incapable of supporting a similar library. But this is just one of dozens of possibilities right in this room.

(3) As everyone in the business knows, there is a tremendous payoff in promotion; libraries need to do more of it. Go read some books on it, and don't think of it as unseemly. If you can't budget for it overtly, do it covertly, but do it. Information centers are simply too much taken for granted and far too underutilized.

(4) The time may have to come to expand the librarian's role in a truly scholarly direction - into those areas we call reduction tasks - the writing of abstracts, reviews and overviews. Such special librarians might

be called "readers" (to borrow the British term for an assistant professor); they will need at least a masters degree in a subject area and perhaps a Ph.D. But reading as we've defined it has scholarly importance equal to that of education and research in spite of the fact there is not a formal slot for it. Its importance can only increase as the increasing bulk of information demands more than its characterization - it demands a new scholarly tier (with a literary and verbal bent) whose task is to reduce it and put it in context.

SOCIETY PUBLISHING TODAY AND TOMORROW

A. Fred Spilhaus, Jr., Executive Director
American Geophysical Union, Washington, D.C.

Thank you for inviting me to participate in your meeting. I very much enjoyed our first opportunity to get to know each other at the joint meeting of the International Association of Marine Science Libraries and Information Centers and the Association of Earth Science Editors in Halifax three years ago. I particularly appreciate the opportunity to return to you because I believe there is an urgent need for a better mutual understanding of the roles each of us plays in the scientific communication process. Our roles and responsibilities overlap and intertwine, and yet we seem to have very few opportunities to get together and to talk out how we can make the whole process more efficient and effective.

While Dun and Bradstreet would classify me as a publisher, and I often wear that hat, I am, as each of you is, first and foremost a member of the community that does science. Our job is to advance knowledge by facilitating communication between and among scientists across the street, across the country, across the oceans, and across the decades.

Today I intend to discuss some of the motivations and constraints that are shaping the American Geophysical Union's current thinking as a scientific society and how these will probably affect our publishing plans in the immediate future.

As a scientist, I live in an unbounded N-dimensional world of wonder. But as a pragmatic executive I live in a three-dimensional world. My dimensions are time, quality, and cost. This is a very finite, bounded universe.

You can begin to appreciate its shape by looking at the theoretical limits. Perfection cannot be achieved in less than infinite time and requires infinite cost, and with either no time or no money, nothing can be achieved.

At AGU we are trying to explore the edges of this universe. For example, how can we achieve the same quality at the same cost, in less time? We are trying to find better ways so that we can expand our horizons.

In its role as a publisher a scientific society is likely to be very different from its commercial and government counterparts. Since the board of directors or council of the society is made up of authors and readers, their actions will reflect these points of view first, and only secondarily will the finances of the society come into the picture. Additionally, those who reach the councils of scientific societies tend to be men of high ideals and absolute certainty of the rectitude of their opinions. Fortunately, they rarely agree. The result is lively discussion and programs that are usually soundly based and address the real needs of the community, but the process is slow and often painful.

At a recent AGU Council meeting a proposal to start two new journals was debated. The first reaction of most council members as readers was that there are too many journals. Worse yet, the proposed journals were to be printed from typewritten copy, so the council members as authors who do not like their papers in typewritten copy rejected it. No one at any time during the debate questioned the financial viability of the project, the cost to AGU, or the potential profits. The discussion centered on the communication need. Should there be one journal or two covering the subjects? What was the outlook for the field?

It was a stimulating debate, and to my surprise, despite all the negative prejudices, the Publications Committee position prevailed. While all the details are not settled yet, by the end of 1985 AGU will be publishing two new journals. The first will be in the general area of paleoceanography, and the second, global chemical cycles and global change. The decision-making process gives one confidence that the result will serve the best interests of the scientific community.

Why did the AGU Publications Committee want to start two new journals at this time? The answer is that we are feeling pressure from journals that offer publication without page charges. The journals of AGU and those of other societies are in head-to-head competition with a plethora of commercial journals. This competition is not for subscribers; it is for authors. Societies are meeting the competition in different ways. The American Physical Society has recently lowered page charges for the Physical Review significantly. AGU is not moving in that direction because lowering of page charges requires very large subscription rate increases, which we believe would lead to decreases in circulation. We are offering additional new journals without page charges as an alternative to the page charge journals. However, the number of pages in the new journals must be strictly limited. Let me talk for a few minutes about page charges and subscription rates.

Figure 1 shows the number of people who will buy a given publication as a function of the price of the publication. This is the conventional demand curve of economic theory - as the price goes up, there are fewer and fewer buyers who find enough value in the publication to warrant the price. The sum

of the number of new purchasers, at each price, as the price goes down, multiplied by the price they are willing to pay can be thought of as the total value of the publication to society. This value is represented geometrically by the total area under the curve n(p) (Herring 1970).[1]

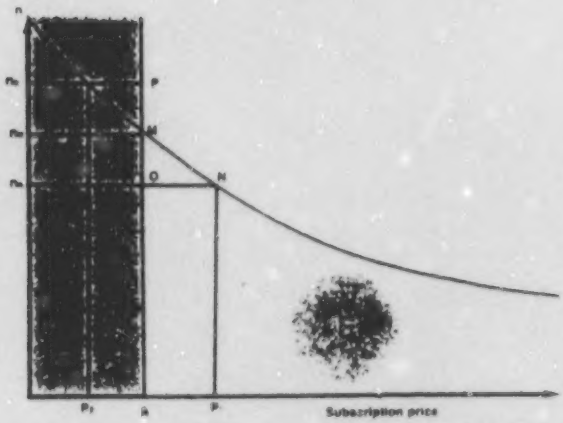
Point A is the cost of servicing an added or incremental subscription, that is, the cost of paper, press work, binding, mailing, postage, etc. for each new subscription. This number does not include costs, such as editing, typesetting, or press setup, that do not vary with the number of copies printed. These fixed costs are represented by the circle labeled F. The area under the curve n(p) (i.e., the total of what purchasers are willing to pay), reduced by the cross-hatched areas, is the net value of the publication.

The next step is to determine the optimum price. If we set the price at P_1 (any price greater than A), the net value is reduced by the triangular area OMN. This represents the value lost because $n_M - n_N$ potential purchasers were unwilling to buy the journal.

If the price is set at P_2 (any price less than A), there are $n_O - n_M$ purchasers who are not even paying the incremental cost of their copies; the difference between the incremental cost and what they are paying, which is represented by QPM, reduces the net value under the curve n(p). Therefore, the closer the price is to A, which is the incremental cost of supplying the publication, the greater its net value to society.

This is a rather simplified model but, refine it as you will, the basic lesson remains. It is counter-productive to sell any publication at below incremental cost, and the maximum value to society is realized if publications

FIGURE 1



The number of purchasers for a given publication plotted against the subscription price. The area labeled F represents fixed costs of producing the publication.

can be made available at their incremental cost. How then do we cover fixed costs? In this simplified model, all fixed charges must be paid another way, such as by the author in the form of page charges. Thus, there is a good theoretical basis for assessing page charges at a level equal to the fixed cost per page. Unfortunately, in the real world there are many circumstances in which page charges are impractical and few that I know of in which the page charges can be relied on to provide 100% of the support for fixed costs. Therefore, purchase prices higher than the incremental cost are mandated.

It is also impractical to have an infinitely variable purchase price that depends on each purchaser's perception of value; therefore a multi-tiered pricing schedule is usually set. In following this technique one focuses on max-

imum distribution and reasonable cost to each class of purchaser. A typical schedule might include a level for students, one for individuals, and one for institutions. In accord with the argument above, the lower bound for the student rate is the incremental cost. For other individuals one makes the best estimate of where price resistance begins so as to stay on the low-price side of the elastic portion of the demand curve. Then one sets the institutional price to make up the difference in required revenue. Thus page charges go toward reducing institutional subscription rates.

I have heard it alleged that multi-tiered pricing structures constitute a subsidy by institutions to individual purchasers. To explore this assertion, let us consider a model in which we have a 500-page publication that costs $100,000 to produce. If this publication were sold at a single price of $100, one would need 1,000 purchasers to break even. The $100 price tag is likely to severely limit the individual market, as reflected in the first column of Table 1.

TABLE 1

Comparison of Publication Pricing Structures

	One-price	Two levels	Two levels with page charge and a student price
Sales (Total)	1000		
Institutions		2000	2700
Individuals		1000	1200
Students		1000	1500
			X
Production cost	$100,000	$110,000	$117,000 + $10X
Incremental cost/copy		$10	$10
Page charge			500 pp @ $40 = $20,000
Price	$100		
Institutions		$80	$56
Individuals		$30	$20
Students			$10

BEST COPY AVAILABLE

Now let us suppose that the incremental cost for producing a copy of this publication is $10 per copy. This is not an unreasonable assumption for a heavily mathematical text that has been carefully edited and typeset. The bulk of the costs for scientific publications are fixed costs that remain constant regardless of the number of copies printed. If I set a price of $30 to individuals and can pick up 1,000 more sales this way, I pick up $30,000 in revenue and only $10,000 in expense; therefore, the institutional price can drop to $80. Multi-tiered pricing thus benefits the discipline through much broader dissemination and the purchasing institution through lower prices.

Now let us go a step farther and assume that we add a page charge of $40 per page. If we then reduce the cost to individuals to $20 and assume a sale of 1500, the $20,000 of income from page charges reduces the amount required from the institutional purchaser to $60 per copy, and if the drop in price from $100 to $60 induces 200 more of them to purchase the volume, the price would be only $56. Thus we see that page charges can have a downward spiraling effect on institutional prices and at the same time can help assure maximum individual dissemination.

As a final twist, I could add a student price at the incremental cost of $10, and thus obtain an even wider dissemination. We need not make any calculation of income or expense for the copies sold to students since each one pays exactly for itself.

At the present time, AGU does not intend to abandon page charges. Doing so would place essentially the whole burden of paying for publication on the institutional subscriber. Nevertheless, to serve a large segment of our

authors we are going to have to provide more ways to publish without paying the page charge. This is particularly true for those who are in specialities where grants are small, such as in theoretical studies and those non-U.S. authors whose funding does not include provisions for publication.

Another issue that continually plagues us is, how do you slice up the disciplinary pie? We are now publishing about 12,000 pages per year in the Journal of Geophysical Research. It costs about a penny to print and mail each of those pages. Most people who want to read about oceanography do not care about space physics, but some do. Most people who want to read about oceanography do have a peripheral interest in meteorology or marine geology or geochemistry. The problem is, do you divide the package and, if you do, how large do you make the units and where do you draw the lines? This problem arises both in dividing the large interdisciplinary journals like the Physical Review and the Journal of Geophysical Research that appear in disciplinary sections and in defining specialized journals.

The Journal of Geophysical Research is now divided into four sections, each of which costs a member between $25 and $60. The price is based strictly on the number of pages in the section. We do not feel we can push that member price up much above $60 without losing many member subscriptions. Therefore, we must either restrict the number of pages we publish or further subdivide the journal over the coming years. Neither prospect pleases the idealist.

The last subdivision we made was between oceanography and meteorology, and as some of you probably know, we have not given institutions the option of taking those sections

separately. That is because of a strong feeling that institutional libraries that have one of these sections should have the other because the air/sea interface is so important.

In the specialized journal area, similar problems exist. One of the major questions asked about the two journals AGU approved last spring was whether indeed there should be two. There are those who see all global chemical cycles as being reflected in paleoceanography and paleoatmospheres and who feel that with a clever reworking of the scopes one could get by with a single journal. The battle of the lumpers and splitters will continue forever.

In quality-time-cost space the normal relationship is that quality increases with time, but there are some offsetting factors. A scientific journal that is not timely loses value. So as time increases, after a certain point, quality may decrease. Cooperation between editors, production staffs, and printers, as well as a thorough understanding of distribution channels, is essential to maximizing value.

Most formal scientific communication has been mistreated in the mail several times before it reaches its final destination. Articles are submitted, sent for review, returned, revised, sent to publishers and/or printers, and finally a journal is mailed to the subscriber. The United States has one of the most reliable mail systems in the world, and that is, unfortunately, damning with very faint praise. The variety of accidents that befall publications on their way to their ultimate destination is incredible. Mangling seems to be a daily occurrence and water damage another regular hazard.

Overseas delivery is a problem and not just because of inefficient mail services. It is a long way to western Europe and much

farther to Japan and Australia, and yet there are scientific communities there that complement those in the United States and that need to communicate on a real-time basis. Receiving journals six to twelve weeks after their colleagues in the United States is unacceptable and yet the rule. Until we have electronic access, the choices are airmail, or airfreight and local mail, or printing locally if you are doing a high-volume job like Time or the Wall Street Journal. The extra charge for overseas airmail for the Journal of Geophysical Research is currently $214. Very few subscribers want to pay that on top of their already heavy costs for subscriptions.

We are particularly concerned with the delivery of Eos, our weekly newspaper, both in the United States and overseas. In the United States it receives newspaper treatment and gets almost everywhere within a week. In Canada it sometimes gets the counterpart special treatment it is entitled to but still rarely arrives in British Columbia in under three weeks. We airfreight to Europe and lose money on every subscription there. But if we did not, we would have a lot of angry members because we are publishing things they need that have significant time value. The current strength of the dollar precludes consideration of increasing individual fees to cover such costs. As an alternative we are now looking very seriously at the possibility of making Eos available electronically so that it would be accessible in Australia at the same time as in the United States. This would not supplant the printed edition. In fact, my guess is that few in the United States would bother with the electronic edition unless they were job hunting. The habits of reading a newspaper are strongly ingrained.

Photocopying poses another major dilemma. We, as a scientific society, view photocopying as a fine way to augment the circulation of scientific materials. On the other hand, it is our responsibility to see that the original publications that are being copied continue to be available. Thus income is necessary. Numbers of subscriptions have been dropping over the last 20 years, and while some of these may have been for volumes that were never opened, others have surely been replaced by photocopies of needed articles. These decreasing numbers have resulted in rising subscription rates, which in turn have further restricted dissemination. Adjusting to photocopying as a major mode of dissemination has proved extremely difficult, and there is a long way to go.

One of the most unfortunate consequences of the increased subscription rates that are a direct result of photocopying is a reduction in the richness of libraries accessible to students in smaller institutions, and in fact everywhere, as you are forced to trim the items of peripheral interest out of your collections. If these decisions were made on a system-wide economic basis, they would make sense. But they are not. Each of us has our own budgets, and while ostensibly we see the same priorities, we are constantly shifting the burden from one sector to another, often without recognizing that we may be increasing the total system cost. You know that the real total cost for photocopying an article in the library is probably $5 or more, not 10 cents a page. But if the reader does it, he or she bears the salary and overhead charges. Page charges reduce library costs, but for an institution with a large research program, total costs will go up. For those with smaller research

programs, total costs may go down. It can be argued that this is a fair distribution, since those with large research programs benefit more from the journals than those with smaller ones.

I have tried to give you some feel for a few of the opportunities we have to improve the efficiency and effectiveness of the scientific communications process right now and further constraints on the system as well. We are dealing with a complex interactive system that is being driven by economics, psychology, and technology. The only thing I can say with certainty is that the road is not clear.

AGU's current strategy is:

1) to keep abreast of what is happening in libraries, in printing, and in the application of computers and other new technology to publication;

2) to perform interesting experiments that are reversible and reasonably small in scale;

3) to watch the leaders or pacesetters, such as the American Institute of Physics, the American Chemical Society, and selected large commercial concerns;

4) to keep open every possible option for media, such as separates, fiche, and prepublication abstracts, and to protect these options through copyright and;

5) to maintain a strong financial position that will permit us to move in whatever direction seems best in the future.

I look forward to a continuing dialogue with you on how we can strengthen the scientific communication network.

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EVOLUTION AND EFFECTIVENESS OF TREATIES: MARINE POLLUTION CONTROL

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The importance of international treaties as a medium for diffusion of information on cooperative process between sovereign nations has not been addressed vigorously by political scientists, geographers, or librarians. An examination has been made of international agreements involving marine pollution on three scales - pollution of international rivers and freshwater lakes (involving as few as two states), pollution of regional seas and gulfs (numerous participants) and pollution of the high seas (with reference to the new Law of the Sea). Refinements in pollution control are incremental, and there is much exchange between municipal law and international law in regulatory measures proposed in these treaties. Examples will be given to alert the marine science librarian of the importance of collecting treaty texts as a forecasting tool for future domestic policy, and domestic legislation as forerunner for international policy.

I'd like to begin with a quotation from Thomas Jefferson, which may give relevance to my presentation:

> "I am not an advocate for frequent changes in laws and constitutions. But laws and institutions must go hand in hand with the progress of the human mind. As that becomes more developed, more enlightened, as new discoveries are made, new truths discovered and manners and opinions change, with the change of circumstances, institutions must advance also to keep pace with the times. We might as well require a man to wear still the coat which fitted him when a boy as civilized society to remain ever

143

under the regimen of their barbarous ancestors."

These are fine-sounding words, expressing an ideal for the nation to strive toward, if not yet to have attained. Similarly treaties, which in the realm of law are considered valid contracts between two or more sovereign nations, are often in reality only expressions of ideals toward which to strive.

My interest, as you have guessed from the title, is in marine pollution prevention on a global scale. I have examined treaties on water quality control. Taken over time, in my opinion the picture I will present to you indicates an encouraging trend in environmental control - in spite of the reality that many of the objectives have not been obtained, have even, in fact, been flagrantly disregarded at times.

In the latter part of the 19th century, protection of fishing "industry" was most important, and we find poisons and industrial wastes prohibited in many European bilateral "river treaties."

"In the Rhine, the Untersee and their tributaries certain fishing devices will not be permitted. Poisonous and explosive substances and instruments capable of injuring fish are prohibited...Industrial wastes may not be led into the water courses."
(Convention between the Grand Duchy of Baden and Switzerland concerning Fishing in the Rhine between Constance and Basel, Bern, 9 December 1869, Summary)

"In order to protect against pollution of fishing waters both Governments shall enact controls against the discharge of effluents from agriculture or industrial wastes in such quantities which are likely to endanger fishing."
(Convention between the Grand Duchy of Hesse and the Kingdom of Prussia for the Protection and Promotion of Fishing, Berlin, 19 January 1980, Summary)

"...Prohibited are fishing methods involving chemical or explosive substances. All factories or plants located along the Lake are required to discharge their waste products into the ground at their own cost and are prohibited to introduce them into the Lake."
(Convention between France and Switzerland Regulating Fishing in the Frontier Waters, Paris, 28 December 1880. Summary)

"The Contracting Parties are entitled...to take the necessary measures to prevent polluted waters from flowing into the Lake."
(Convention between Austria-Hungary and Italy concerning Fishing in the Lake Garda, Riva, 9 August 1883. Summary)

"It is prohibited to direct industrial waste waters harmful to the environment into the rivers."
(Convention between Switzerland, the Grand Duchy of Baden, and Alsace-Lorraine, Establishing Uniform Provisions on Fishing in the Rhine and its Tributaries, Including Lake Constance, with Final Protocol. Lucerne, 18 May 1887. Summary)

The Madrid Declaration of 1911 was the first co-operative effort to deal with problems of river basins other than navigational matters.

"...Neither State may, on its own territory, utilize or allow the utilization of the water in such a way as seriously to interfere with its utilization by the other State...
2. All alterations injurious to the water, the emptying therein of injurious matter (from factories, etc.) is forbidden..."
(International Regulations regarding the Use of International watercourses for Purposes Other than Navigation. Adopted by the Institute of International Law at Madrid. Madrid Declaration, 20 April 1911)

United States and Canada together made the first mention of health of the people a primary concern.

"...waters flowing across the boundary should not be polluted on either side to the injury of health or property on the other,...

Whenever...it has been established that waters on one side of the boundary line have been polluted to the injury of health and property on that side, such pollution shall be deemed to be injurious to health and property on the other side until the contrary is proved...

The (IJC) may define...classes of vessels in which apparatus for the disinfection of the sewage, bilge-water or water ballast discharged therefrom should be installed to prevent the pollution of waters..."

(United States of America-Canada. International Joint Commission. Draft Treaty on Pollution Prevention of 1920.)

Even colonies had concern for river pollution and its effect on the local populations.

"No operations of a mining or industrial nature shall be permitted by either of the Contracting Governments in Tanganyika or Ruanda-Urundi respectively which may pollute or cause the deposit of any poisonous, noxious or polluting substance in the waters of any river or stream forming part of the boundary between the Tanganyika Territory and Ruanda-Urundi or any tributary river or stream thereof, or in any river or stream flowing from one territory into the other."

(Agreement between the United Kingdom of Great Britain and Northern Ireland and Belgium Regarding Water Rights on the Boundary Between Tanganyika and Ruanda-Urundi. London, 22 November 1934.)

Oil pollution was seriously considered by diplomats in conference as early as 1926, and again in 1935, but no agreement was ever reached regarding facilities for receiving oily discharge until the 1954 Law of the Sea.

"Article I.

The respective Governments may establish areas in waters adjacent to their coasts within which discharge... of oil or oily mixtures...shall be prohibited...

Article II.

The discharges which may be prohibited in any area prescribed pursuant to Article I are (a) crude, fuel or diesel oil, or (b) any mixture containing more than .05 of one per cent of such oil, or having a content of such oil sufficient to form a film on the surface of the sea visible to the naked eye in daylight in clear weather."

(Final Act and Draft Convention of the Preliminary Conference on Oil Pollution of Navigable Waters, Washington, 16 June 1926)

Explosive materials leaking pollution was a post-war phenomenon which shaped our perception of nuclear pollution in the succeeding decades.

"...the problems raised by the installation in the vicinity of the frontier of storage depots of explosive materials for civil use, and...the problem of water pollution requir(e) detailed technical study...

The joint technical sub-committee shall have the following terms of reference:

(A) to define the pollution factors (industrial or communal origin, degree of intensity, etc.), collect any appropriate technical opinions, assess each State's share of responsibility for the pollution;

(B) to draw up a report...on the action to be recommended...

The Tripartite Standing Committee on polluted waters reserves the right to set up further technical sub-committees when it takes up the study of the pollution of other waterways deemed to be the cause of unhealthy conditions in the territory of one of the three signatory States."

(Protocol Between France, Belgium and Luxembourg to Establish a Tripartite Standing Committee on Polluted Waters, Brussels, 8 April 1950)

"...take whatever action is necessary to assist States in controlling the discharge or release of radio-active materials to the sea, in promulgating standards, and in drawing up internationally acceptable regulations to prevent pollution of the sea by radio-active materials in

147

amounts which would adversely affect man and his marine resources."
(Convention on the High Seas, Resolution Relating to Article 25, Pollution of the High Seas by Radio-Active Materials, Geneva, 23 April 1958)

"...the High Contracting Parties shall ensure that the waters of the canal in the vicinity of the Belgian-Netherlands frontier meet the standards of quality set forth in Annex III to this treaty...
The two Governments shall supply each other with all such particulars concerning existing or future installations that discharge liquid and/or solid radioactive waste into the section of the canal situated in their territory as are needed to determine the extent to which the waters of the canal have become radioactive as a result of such discharge."
(Treaty between the Kingdom of Belgium and the Kingdom of the Netherlands concerning the Improvement of the Terneuzen and Ghent Canal and the Settlement of Various Related Matters, Brussels, 20 June 1960)

"Article II.

1. The operator of a nuclear ship shall be absolutely liable for any nuclear damage...caused by a nuclear incident involving the nuclear fuel of, or radioactive products or waste produced in such a ship."
(Convention on the Liability of Operators of Nuclear Ships, Brussels, 25 May 1962)

"Article II.

1. The operator of a nuclear installation shall be liable for nuclear damage upon proof that such damage has been caused by a nuclear incident
(A) in his nuclear installation; or
(B) involving nuclear material coming from or originating in his nuclear installation..."
(Convention on Civil Liability for Nuclear Damage, Vienna, 21 May 1963)

Eutrophication was first addressed in this 1952 document.

"In order to maintain the frontier water in proper condition each Contracting Party undertakes...

(4) To prevent, by appropriate means and installations, any waters... and any effluents from towns, settlements or industrial plants from introducing into the said rivers physical, chemical or bacteriological impurities of such nature and in such quantitites as:

(A) To affect adversely the use of the water of the said rivers for domestic requirements, water supply, industry and agriculture;

(B) To cause bridges, dams, other water engineering works and installations, and vessels to become corroded and overgrown with slime and aquatic flora and fauna;

(C) To cause the excessive accumulation of slime on the bed and banks;

(D) To affect adversely the normal development of the typical aquatic flora and fauna of the said rivers."
(Agreement between the Government of the Polish Republic and the Government of the German Democratic Republic concerning Navigation in Frontier Waters and the Use and Maintenance of Frontier Waters. Berlin, 6 February 1952)

Canadians were the first to mention concern for fish and wild-life protection.

"That any machine, plant, vessel, barge or operators or crews thereof, used on these works, shall not be permitted to tie up, discharge ashes, fuel oil, waste oil, etc. or to commit any other nuisance in a manner prejudicial to the health, well-being and activities of the owners and/or users of land or water areas...during the progress of, or subsequent to, the carrying out of these works; the attention...is also drawn to... the Fisheries Act of Canada, and ... the Migratory Birds Convention Act which refer to the pollution of waters with specific reference to the effect upon fish and migratory birds;"
(Exchange of Notes Constituting an Agreement between the United States of America and Canada relating to Navigation Improvements of the Great Lakes Connecting Channels of the Saint Lawrence Seaway, Ottawa, 30 November 1956, and 8-9 April 1957)

149

"Article II - General Water Quality Objectives

...These waters should be:

(A) Free from substances that enter the waters as a result of human activity and that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life or waterfowl;

(B) Free from floating debris, oil, scum and other floating materials entering the waters as a result of human activity in amounts sufficient to be unsightly or deleterious;

(C) Free from materials entering the waters as a result of human activity producing colour, odour or other conditions in such a degree as to create a nuisance;

(D) Free from substances entering the waters as a result of human activity in concentrations that are toxic or harmful to human, animal or aquatic life;

(E) Free from nutrients entering the waters as a result of human activity in concentrations that create nuisance growths of aquatic weeds and algae.

Article V - Programs and Other Measures

(A) Pollution from Municipal Sources...

(B) Pollution from Industrial Sources...

(C) Eutrophication...

(D) Pollution from Agricultural, Forestry and Other Land Use Activities...

(E) Pollution from Shipping Activities...

(F) Pollution from Dredging Activities...

(G) Pollution from Onshore and Offshore Facilities..

(H) Contingency Plan...

(I) Hazardous Polluting Substances..."

(Agreement Between the United States of America and Canada Concerning the Great Lakes Water Quality, Ottawa, 15 April 1972)

The International Law Association, while not an official international power, has made recommendations quite often followed in later treaties. In this document of recommendations from their biennial meetings, the ILA redefined rivers in a drainage basin as an "integrated whole," long before ecology was a household word.

"Agreed principles of International Law.

1. A system of rivers and lakes in a drainage basin should be treated as an integrated whole (and not piecemeal).

Comment: Until now international law has for the most part been concerned with surface waters. It may be necessary to consider the interdependence of all hydrological and demographic features of a drainage basin.

Agreed Recommendations.

8. Co-riparians should take immediate action to prevent further pollution and should study and put into effect all practicable means of reducing to a less harmful degree present uses which lead to pollution."

(Statement of Some Principles of International Law Governing, and Recommendations Respecting, the Uses of the Waters of Drainage Basins within the Territories of Two or More States, as to which the Members of the Committee Present at the New York Conference have Reached Unanimous Agreement, adopted by the International Law Association at its 48th Conference at New York, 1958)

The London Convention in May 1954 mandated oily-water separation as treatment for bilge water in lieu of dumping at sea, but then issued an amendment in stronger language advocating complete avoidance of discharge, which, along with such publicized oil-spill disasters as "Torrey Canyon" off the British coast in 1967, and the "Amoco Cadiz" spill on the French coast in 1978 have created pressure on the shipping industry.

"Resolution 1.

The Conference have noted that the coasts and coastal waters of many countries are seriously affected by oil pollution, the results of which include great damage to coasts and beaches and consequent hindrance to healthful recreation and interference with the tourist industry, the death and destruction of birds and other wild life, and probable adverse effects on fish and the marine organisms on which they feed. There is widespread public concern

in many countries about the extent and the growth of this problem.

The pollution is caused by persistent oils, that is to say, crude oil, fuel oil, heavy diesel oil and lubricating oil. While there is not conclusive evidence that these oils persist indefinitely on the surface of the sea, they remain for very long periods of time and are capable of being carried very considerable distances by surface drifts caused by winds and currents and of building up into deposits on the sea-shore. Very large quantities of persistent oils are regularly discharged into the sea by tankers as a result of the washing of their tanks and the disposal of their oily ballast water. Dry cargo ships which habitually use their fuel tanks for ballast water also discharge oily ballast water into the sea and this also gives rise to pollution. It is practicable for tankers to adopt a procedure whereby their oily residues can be retained on board and discharged into reception facilities at oil loading ports or repair ports.

Pollution resulting from the discharge of ballast water from dry cargo ships can be reduced or prevented by the installation of efficient oily water separators or other means, such as the provision in ports of adequate reception facilities for oil residues.

The only entirely effective method known of preventing oil pollution is the complete avoidance of the discharge of persistent oils into the sea and, as stated above, measures are possible which would enable this to be substantially achieved."

(Resolutions Adopted by the International Conference on Prevention of Pollution of the Sea by Oil, London, April 1962 as Amendment to the London Convention on Prevention of Pollution of the Sea by Oil, 1954)

Voluntary agreements by the oil tanker owners in 1969 and 1974 addressed costs of oil-spill damages, and further efforts at oil spill prevention and detection will be indicated later.

"The Parties to this Agreement are Tanker Owners whose vessels are engaged in the transportation of Oil in bulk

by sea, and who recognize that Coast Lines may on occasion sustain Damage by Pollution as a result of Oil discharged when marine casualties occur. They are furthermore aware of the fact that traditional maritime laws and practice do not always provide an adequate means for re-imbursing Governments which incur expenditures to avoid or mitigate such damages, as well as tanker owners who, on their own initiative, incur such expenditures...

In a voluntary effort to establish their responsibility.. the Parties... do hereby agree as follows:

Article IV. Liability and Responsibility to Governments

(A) If a discharge of Oil occurs from a Participating Tanker through the negligence of that Tanker (and regardless of the degree of its fault), and if the Oil causes Damage by Pollution to Coast Lines within the jurisdiction of a Government or creates a grave and imminent danger of Damage by Pollution thereto, then the Participating Owner of that Tanker shall Remove the Oil so discharged, or pay the costs reasonably incurred by the Government concerned to remove the said Oil...

Article IX. Law Governing

This Agreement shall be governed by the laws of England."

(Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution "TOVALOP", London, 7 January 1969)

"The parties to this contract are Operators of or intend to be the Operators of Offshore Facilities used in connection with exploration for or production of oil and gas.

Each of the Parties has resolved to provide an orderly means for compensating and reimbursing any Person who sustains Pollution Damage and any State which incurs costs for taking Remedial Measures as a result of a Discharge of Oil from any Offshore Facility so used...up to an overall maximum of U.S. $16,000,000 per Incident..."

(Amoco-British Petroleum-Burmah-Compagnie Francaise des Petroles-Continental-Exxon-Gulf-Hamilton-Mobil-Petrofina-Phillips-Shell-Texaco: Offshore Pollution Liability Agreement, "OPOL", London, 4 September 1974)

U.S.S.R. signed bilateral agreements with every border state on issues of health. Interest-

153

ingly enough, these have not been repeated in later texts.

"It is prohibited to dump animal carcasses, animal litter or fodder wastes into the river, or to open hatchways to dump refuse.
On arrival in port, carcasses and wastes shall be burned or buried in accordance with the health and veterinary regulations in force in the state concerned."
(Recommendations concerning the Unification of the Regulations Governing the Protection of Fauna and Flora in the Danube, Adopted by the Danube Commission at its 16th Session, 1958)

"It is prohibited to dump into the river the corpses of persons who have died on board.
The corpses of persons who died from a disease requiring quarantine or from any other communicable disease shall be buried in the nearest port, in accordance with the health regulations of the state concerned."
(Recommendations Concerning the Unification of the Health Regulations relating to the Danube, adopted by the Danube Commission, 2 February 1962)

Timber or logging as a source of pollution is addressed in Scandinavian agreements.

"Article 4.
The Contracting Parties shall take measures to ensure that frontier watercourses are not polluted by untreated industrial effluents and sewage, by waste materials from timber-floating or wastes from ships or by other substances which, immediately or in the course of time, might cause shoaling of the watercourses, harmful changes in the composition of the water, damage to the fish-stock or substantial scenic deterioration or might endanger public health or have similar harmful consequences for the population and the economy."
(Agreement between the Republic of Finland and the Union of Soviet Socialist Republics concerning Frontier Watercourses, signed at Helsinki, 24 April 1964)

The Helsinki Rules on the uses of waters

of international rivers of 1966 - not to be confused with the Helsinki Agreement on Safety and Co-operation in Europe - are quoted almost verbatim in Articles to be found in the New Law of the Sea. These rules, it must be remembered, precede the Stockholm Conference and the "Environmental Movement" of the 1970s.

"Chapter 3 - Pollution

Article IX.

As used in this Chapter, the term 'water pollution' refers to any detrimental change resulting from human conduct in the natural composition, content, or quality of the waters of an international drainage basin.

Article X.

1. Consistent with the principle of equitable utilization of the waters of an international drainage basin, a State

(a) must prevent any new form of water pollution or any increase in the degree of existing water pollution in an international drainage basin which would cause substantial injury in the territory of a co-basin State, and

(b) should take all reasonable measures to abate existing water pollution in an international drainage basin to such an extent that no substantial damage is caused in the territory of a co-basin State.

...the State responsible shall be required to cease the wrongful conduct and compensate the injured co-basin State for the injury that has been caused to it."

(The Helsinki Rules on the Uses of the Waters of International Rivers, Adopted by the International Law Association at its Fifty-Second Conference, Helsinki, 20 August 1966)

Quantitative standards are spelled out in detail in the annexes to these European Community Council Directives, which are binding on member states, and reflected in national policies.

"Observing that the general household and industrial use of certain types of detergents might cause considerable prejudice to these interests (water supply, natural aquatic fauna and flora)...washing or cleaning products containing one or more synthetic detergents are not put on the market unless the detergents... are... at least 80% susceptible to biological degradation."
(European Agreement on the Restriction of the Use of Certain Detergents in Washing and Cleaning Products, Strasbourg, 16 September 1968)

"Whereas one of the pollutant effects of detergent on waters, namely the formation of foam in large quantities restricts contact between water and air, renders oxygenation difficult, causes inconvenience to navigation, impairs the photosynthesis necessary to the life of aquatic flora, exercises an unfavourable influence on the various stages of processes for the purification of waste waters, causes damage to waste water purification plants and constitutes an indirect micro-biological risk due to the possible transference of bacteria and viruses;
Whereas it is desirable to maintain an average level of biodegradability of detergents of 90% and whereas technology and industrial practicalities make this possible...
Member States shall prohibit the placing on the market and use of detergents where the average level of biodegradability of the surfactants contained therein is less than 90% for each of the following categories: anionic, cationic, non-ionic and amphionic."
(European Communities: Council Directive on the Approximation of the Laws of the Member States Relating to Detergents, 22 November 1973)

The Scandinavian countries were the first to sign agreements pertaining to the sighting and co-operation on combating oil spills in the Baltic Sea and the North Sea.

"Recognizing that grave pollution of the sea by oil in the North Sea area involves a danger to the coastal states,

Noting that the Council of the Inter-Governmental Maritime Consultative Organization...decided to include among the matters requiring study as a matter of urgency, inter alia,

Procedures whereby States, regionally or inter-regionally where applicable, can co-operate at short notice to provide manpower, supplies, equipment and scientific advice to deal with discharge of oil or other noxious or hazardous substances...

Have agreed on the following:...

This Agreement shall apply whenever the presence or the prospective presence of oil polluting the sea within the North Sea area...presents a grave and imminent danger to the coast or related interests of one or more contracting Parties.

Contracting Parties undertake to inform the other Contracting Parties about...

(c) new ways in which oil pollution may be avoided and about new effective measures to deal with oil pollution.

Article 7.

A Contracting Party requiring assistance to dispose of oil floating on the sea or polluting its coast may call upon the help of the other Contracting Parties..."

(Agreement for Co-operation in Dealing with Pollution of the North Sea by Oil, Bonn, 9 June 1969)

The Convention on the Protection of the Marine Environment of the Baltic Sea was the first regional seas accord to address all polluting agents recognized in 1974. The North Sea Treaty of 1969 addressed specifically oil spills, but the Baltic Treaty preceded the Mediterranean Regional Sea Accord by only a year, probably because the signatories of the former were of less cultural divergence than in the latter case.

"Noting with deep concern the increasing pollutions of the Baltic Sea Area, originating from many sources such as discharges through river, estuaries, outfalls and pipelines, dumping and normal operations of vessels as

well as through airborne pollutants:...
Noting that the relevant recent international conventions...do not cover all special requirements to protect and enhance the marine environment of the Baltic Sea Area:...
Conscious of the importance of regional intergovernmental co-operation in the protection of the marine environment of the Baltic Sea Area...
Article 5 - Hazardous substances
The contracting Parties undertake to counteract the introduction, whether airborne, waterborne or otherwise, into the Baltic Sea Area of Hazardous substances as specified in Annex I of the present Convention (DDT and its derivatives, and PCBs).
Article 6 - Principles and obligations concerning land-based pollution measures to control and strictly limit pollution by noxious substances and materials in accordance with Annex II of the present Convention.
(Annex II lists some 16 categories of chemicals, radio active materials, substances having adverse effects on the taste and/or smell of products for human consumption from the sea, or effects on taste, smell, colour, transparency or other characteristics of the water seriously reducing its amenity values, and materials and substances which may float, remain in suspension or sink, and which may seriously interfere with any legitimate use of the sea).
To control and minimize pollution of the Baltic Sea Area by harmful substances the Contracting Parties shall... aim at attaining the goals and applying the criteria enumerated in Annex III of the present convention. (Municipal sewage treatment against eutrophication and health hazards, industrial wastes minimums, and effective nuclear power plant cooling water dispersal are addressed in Annex III.)...
Article 8 - Pleasure craft
The measures shall inter alia deal with adequate reception facilities for wastes from pleasure craft.
Article 9 - Prevention of dumping.
Dumping of dredged spoils... (require) prior special permit..."

(Convention on the Protection of the Marine Environment of the Baltic Sea Area, 22 March 1974)

About this same time, the Caribbean nations issued a Declaration calling for international agreements with power or authority of international law.

"Considering...

That such resources are not inexhaustible since even the living species may be depleted or extinguished as a consequence of irrational exploitation or pollution;

That international co-operation is indispensable to ensure the protection of the marine environment and its better utilization;

Formulates the following Declaration of Principles:

Patrimonial Sea...

2. The coastal State has the duty to promote and the right to regulate the conduct of scientific research within the patrimonial sea as well as the right to adopt the necessary measures to prevent marine pollution and to ensure its sovereignty over the resources of the area.

Marine Pollution

1. It is the duty of every State to refrain from performing acts which may pollute the sea and its sea-bed, either inside or outside its respective jurisdictions.

2. The international responsibility of physical or juridical persons damaging the marine environment is recognized. With regard to this matter the drawing up of an international agreement, preferably of a worldwide scope, is desirable.

Regional Co-operation

1. Recognizing the need for the countries in the area to unite their efforts and adopt a common policy vis-a-vis the problems peculiar to the Caribbean Sea relating mainly to scientific research, pollution of the marine environment, conservation, exploration, safeguarding and exploitation of the resources of the sea..."

(Declaration of Santo Domingo, The Specialized Conference of the Caribbean Countries on Problems of the Sea, Santo Domingo de Guzmon, Dominican Republic, 9 June 1972)

159

Historical and tourist values of water areas now appear as needing protection, and container pollutants are first mentioned in the Mediterranean Accord - the first of the Regional Seas pacts which has since been duplicated and expanded in several other regional pacts, most of which have a general Declaration of Principle followed by one or more Protocols addressing more specific actions. This general pattern occurs in the Kuwait Accord, the Abidjan Accord, the Red Sea Accord, etc.

"Article 1.

The Contracting Parties... shall co-operate in taking the necessary measures in cases of grave and imminent danger to the marine environment, the coast or related interests of one or more of the parties due to the presence of massive quantities of oil or other harmful substances resulting from accidental causes or an accumulation of small discharges which are polluting or threatening to pollute the sea...

Article 2.

...the term "related interests" means the interests of a coastal State directly affected or threatened and concerning, among others:

(a) activities in coastal water, in ports or estuaries, including fishing activities;

(b) the historical and tourist appeal of the area in question, including water sports and recreation;

(c) the health of the coastal population;

(d) the preservation of living resources.

Article 5.

In the case of release or loss overboard of harmful substances in packages, freight containers, portable tanks or road and rail tank wagons, the Parties shall co-operate as far as practicable in the salvage and recovery of such substances so as to reduce the danger of pollution of the marine environment."

(Protocol concerning Co-Operation in Combating Pollution of the Mediterranean Sea by Oil and other harmful Sub-

160

stances in Cases of Emergency, Barcelona, 16 February 1976)

Article 4.

"The dumping into the Mediterranean Sea Area of wastes or other matter listed in Annex I to this Protocol is prohibited.

Article 5.

The dumping into the Mediterranean Sea Area of all wastes or other matter listed in Annex II to this Protocol requires, in each case, a prior special permit from the competent national authorities.

Article 6.

The dumping into the Mediterranean Sea Area of all other wastes or other matter requires a prior general permit from the competent national authorities.

Article 8.

The provisions of Articles 4, 5, and 6 shall not apply in case of force majeure due to stress of weather or any other cause when human life or the safety of a ship or aircraft is threatened.

Annex III(c) - General considerations and conditions

1. Possible effects on amenities (e.g. presence of floating or stranded material, turbidity, objectionable odour, discoloration and foaming).

2. Possible effects on marine life, fish and shellfish culture, fish stocks and fisheries, seaweed harvesting and culture.

3. Possible effects on other uses of the sea (e.g. impairment of water quality for industrial use, underwater corrosion of structures, interference with ship operations from floating materials, interference with fishing or navigation through deposit of waste or solid objects on the sea floor and protection of areas of special importance for scientific or conservation purposes).

4. The practical availability of alternative land-based methods of treatment, disposal or elimination or of treatment to render the matter less harmful for sea dumping."

(Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft, Barcelona, 16 February 1976)

161

"Article 3.

The area to which this Protocol applies... shall be:

(A) the Mediterranean Sea Area as defined in Article 1 of the Convention;

(B) waters on the landward side of the baselines from which the breadth of the territorial sea is measured and extending, in the case of watercourses, up to the freshwater limit;

(C) saltwater marshes communicating with the sea.

Article 4.

1. This Protocol shall apply:

(A) to polluting discharges reaching the Protocol Area from land-based sources within the territories of the Parties, in particular:

- directly, from outfalls discharging into the sea or through coastal disposal;

- indirectly, through rivers, canals or other watercourses, including underground watercourses, or through run-off;

(B) to pollution from land-based sources transported by the atmosphere, under conditions to be defined in an additional annex to this Protocol and accepted by the Parties in conformity with the provisions of Article 17 of the Convention.

2. This Protocol shall also apply to polluting discharges from fixed man-made offshore structures which are under the jurisdiction of a Party and which serve purposes other than exploration and exploitation of mineral resources of the continental shelf and the seabed and its subsoil."

(Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources, Athens, 17 May 1980)

The Economic Council of Europe ruled that the "polluter pay principle" should be adopted as policy, but in reality it must be noted that if the victim shares some clean-up costs, the recovery program advances, as is evidenced by Switzerland, and also by the long-delayed cleanup of potash pollution

in the Rhine River, created by France, harming the downstream nation of Holland, and only now being attacked when Holland agreed to pay some large part of the cost.

"Principles:...

2. Water pollution control should be handled taking account of possible interactions of pollutants on air, land and water.

5. ...In setting criteria and standards, all types of water resources (surface, ground and sea water) and/or effluents should be covered...

9. Each country should take all appropriate steps to prevent pollution of the sea, namely by the direct or indirect introduction by man into the marine environment - including estuaries - of substances or energy which may endanger human health, harm living resources and the marine ecosystem, affect amenities or interfere with other legitimate uses of the sea. Governments should therefore seek to reduce progressively land-based pollution provided by toxic, non-degradable and bio-accumulative substances enumerated in the appropriate supplements to different international conventions;

10. It is essential that legislation on water use and pollution control should be drawn up and applied in such a way that if violations occur effective sanctions can be imposed.

11. The general principle should be adopted that, as far as possible, the direct or indirect costs attributable to pollution should be borne by the polluter."
(Economic Council of Europe: Declaration of Policy on Prevention and Control of Water Pollution, Including Transboundary Pollution, as Adopted by the Economic Commission for Europe at its 35th Session, Geneva, 26 April 1980)

"The Republic and Canton of Geneva shall pay a financial contribution for the benefit of the public bodies of the catchment basin of Lake Geneva undertaking the dephosphatation of the waste water..."
(Agreement Between the Swiss Federal Council, Acting on Behalf of the Republic and Canton of Geneva, and the

163

Government of the French Republic on the Dephosphatation of the Waters of Lake Geneva, Berne, 20 November 1980 Summary)

I have not mentioned the Law of the Sea Treaties before - you are all familiar with them ---

1) International Convention for the Prevention of Pollution of the Sea by Oil, May 1954

2) International Convention on the High Seas, April 1958

3) International Convention on Civil Liability for Oil Pollution, 1969

4) Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matters, 1972

5) Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft, 1973

6) Protocol Relating to Intervention on the High Seas in Cases of Marine Pollution by Substances Other than Oil, 1973

7) Convention on the Prevention of Marine Pollution from Land-Based Sources, 1974

8) Convention on Civil Liability for Oil Pollution Damage Resulting from Exploration for and Exploitation of Seabed Mineral Resources, 1976

the last one following the tenor of Japanese-Korean exchange of notes of two years earlier, and most of these concepts are found repeated in the Articles of the New Law of the Sea, 1982.

"...to confirm...the following arrangements concerning the prevention and removal of pollution of the sea resulting from activities relating to exploration or ex-

ploitation of natural resources in the Joint Development Zone.

1. Blow-out Preventor, etc.

(1) (a) A well which is being drilled shall be equipped with blow-out preventor in case blow-out of oil or natural gas is likely to occur.

(3) (a) When drilling of a well or oil testing is performed, muddy water or its materials for emergency use and such materials as are necessary for making heavy muddy water or for controlling the quality of muddy water shall be stocked at the drilling site."

(Japanese Note and Korean Note, exchanged at Seoul, Korea, 30 January 1974)

"Recognizing that the capacity of the sea to assimilate wastes and render them harmless, and its ability to regenerate natural resources, is not unlimited;

Recognizing that States have... the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction;

Article I.

Contracting Parties shall...take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

Article X.

In accordance with the principles of international law regarding State responsibility for damage to the environment of other States or to any other area of the environment, caused by dumping of wastes and other matter of all kinds, the Contracting Parties undertake to develop procedures for the assessment of liability and the settlement of disputes regarding dumping.

Article XII.

The Contracting Parties pledge themselves to promote... measures to protect the marine environment against pollu-

tion caused by:

(a) hydrocartons, including oil, and their wastes;

(b) other noxious or hazardous matter transported by vessels for purposes other than dumping;

(c) wastes generated in the course of operation of vessels, aircraft, platforms and other man-made structures at sea;

(d) radio-active pollutants from all sources, including vessels;

(e) agents of chemical and biological warfare;

(f) wastes or other matter directly arising from, or related to the exploration, exploitation and associated off-shore processing of sea-bed mineral resources."

(Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, London, Mexico City, Moscow, Washington, 29 December 1972)

"Convinced that international action to control the pollution of the sea from land-based sources can and should be taken without delay, as part of progressive and coherent measures to protect the marine environment from pollution, whatever its origin, including current efforts to combat the pollution of international waterways:...

Article I.

1. The Contracting Parties pledge themselves to take all possible steps to prevent pollution of the sea, by which is meant the introduction by man, directly or indirectly, of substances or energy into the marine environment (including estuaries) resulting in such deleterious effects as hazards to human health, harm to living resources and to marine eco-systems, damage to amenitites or interference with other legitimate uses of the sea."

(Convention on the Prevention of Marine Pollution from Land-based Sources, Paris, 4 June 1974)

"Article 1.

2. "Installation" means:

(a) any well or other facility, whether fixed or mobile, which is used for the purpose of exploring for, producing, treating, storing, transmitting or regaining

control of the flow of crude oil from the seabed or its subsoil;

(b) any well...which has been abandoned...

(c) any well...during the period that any such well is being drilled, including completion, or worked on except for normal maintenance operations;

(d) any well...where such exploration involves the deep penetration of the subsoil of the seabed;..."
(Convention on Civil Liability for Oil Pollution Damage Resulting from Exploration for and Exploitation of Seabed Mineral Resources, London, 17 December 1976)

"Article 194 - Measures to prevent, reduce and control pollution of the marine environment

3. The measures taken pursuant to this Part shall deal with all sources of pollution of the marine environment. These measures shall include, inter alia, those designed to minimize to the fullest possible extent:...

(c) pollution from installations and devices used in exploration or exploitation of the natural resources of the sea-bed and subsoil....

5. The measures taken in accordance with this Part shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.

Article 195 - Duty not to transfer damage or hazards or transform one type of pollution into another

In taking measure to prevent, reduce and control pollution of the marine environment, States shall act so as not to transfer, directly or indirectly, damage or hazards from one area to another or transform one type of pollution into another.

Article 196 - Use of technologies or introduction of alien or new species

1. States shall take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause signifi-

cant and harmful changes thereto.

Article 197 - Co-operation on a global or regional basis

States shall co-operate on a global basis and, as appropriate, on a regional basis, directly or through competent international organizations, in formulating and elaborating international rules, standards and recommended practices and procedures consistent with this Convention, for the protection and preservation of the marine environment, taking into account characteristic regional features.

Article 204 - Monitoring of the risks or effects of pollution

2. In particular, States shall keep under surveillance the effects of any activities which they permit or in which they engage in order to determine whether these activities are likely to pollute the marine environment.

Article 208 - Pollution from sea-bed activities

1. Coastal States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment arising from or in connection with sea-bed activities subject to their jurisdiction and from artificial islands, installations and structures under their jurisdiction,...

Article 210 - Pollution by dumping

6. National laws, regulations and measures shall be no less effective in preventing, reducing and controlling such pollution than the global rules and standards.

Article 217 - Enforcement by flag States

8.Penalties provided for by the laws and regulations of the States for vessels flying their flag shall be adequate in severity to discourage violations wherever they occur.

Article 234 - Ice-covered areas

Coastal States have the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone,...pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance. Such laws and regulations shall have due regard... based on the best avail-

able scientific evidence.

Article 235 - Responsibility and Liability

2. States shall ensure that recourse is available in accordance with their legal systems for prompt and adequate compensation or other relief in respect of damage caused by pollution of the marine environment by natural or juridical persons under their jurisdiction."

(Convention on the Law of the Sea, Montego Bay, December 1982)

Lastly, I ask you to consider the document produced following the U.N. Water Conference of 1977, called the Mar del Plata Action Plan. I have five single-spaced pages extracting just (1)water use and efficiency, (2)environmental and health, and (3)pollution control recommendations, from which I have selected a few statements.

"B. Water Use and Efficiency.

19. (f) Intensify work on determining crop-water requirements, integrate schemes for swamp reclamation and drainage in schemes for comprehensive river development, bearing in mind their effect on hydrological regime and the environment; give due attention to problems of salinity intrusion, particularly in coastal areas, and integrate measures for salinity control;

C. Environment, Health and Pollution Control.

36. (c) Ensure an interdisciplinary approach to such studies so that the full and all-round impact of the water projects can be assessed in a more comprehensive, effective and co-ordinated manner than would otherwise be possible;

36. (g) Ensure that due consideration is given to fisheries, wildlife protection and preservation and waterweed control in the planning and construction of water projects;

36. (l) Identify, protect and preserve superlative examples of unique and scenic lakes, rivers, springs, waterfalls, wildlife and natural areas which embody inspirational national heritage values,...

169

36. (m) Recognize that fresh-water and coastal wetlands are among the most vital and productive of ecological systems because of their values for flood-water storage, as breeding grounds for fish and wildlife, and for their recreational and scientific use....

36. (n) Recognize that while monetary values are often difficult to assign to the benefits of water as a recreational, cultural, aesthetic and scientific resource, the benefits are none the less real and substantial, and should be taken into consideration in the environmental assessment of development projects;

36. (q) Recognize that the range of environmental considerations...needs to...include not only physical, chemical or biological changes, but also the resulting social and economic changes;

39. (e) Devote careful attention to the availability of water and the effects of environmental pollution when deciding on the location and selection of facilities;

39. (g) Adopt the general principle that, as far as possible, direct or indirect costs attributable to pollution should be borne by the polluter;"

(United Nations Water Conference: Mar del Plata Action Plan, Mar del Plata, Argentina, 25 March 1977)

This is a very forward-looking document, and in my opinion should be held in high regard as is the Stockholm Declaration of 1972 on the Environment. I strongly urge you to have a copy of the text of this document in your library, for this is the "Year of the Ocean," but it is also the "Decade of Clean Water."

Effective?

Well, for one example, in 1818 the Rhine River Commission was established, in 1909 the International Joint Commission between Canada and U.S.A., in 1944 the International Boundaries and Water Commission (U.S.A. and Mexico), in 1945 the Pilcomayo River Commission, in 1946 the Uruguay River Com-

mission, in 1959 the Nile River Commission, in 1960 the Indus River Commission, in 1963 the Niger River Commission, in 1972 the Mekong Delta Basin Commission.

In 1967 the first Baltic Sea Treaty was accepted, in 1969 the North Sea Treaty, in 1974 a treaty protecting the Adriatic, and also the Sea of Japan Treaty.

In 1972, an important article in a legal journal, entitled "Should Trees Have Standing," by Christopher Stone, appeared which has changed the legal perception of environmental protection. In 1978, from India came an article, "Do Animals Have Rights?"

It is said that imitation is the sincerest form of flattery, and in these cases the replication of an ideal to other locations and situations indicates to me that the basic intent is morally good and practically expedient. Public opinion and "customary acceptance", as they say in legalese, set the cultural or societal norm. Even domestic laws are violated daily, but public opinion demands punishment for the offenders, not neglect by those in authority. So with international law - - - as public opinion leads to a global consensus on what is normative behavior, the international agreements gain in authority, and violations lessen. For that reason, I beg all of you to keep an ear or an eye open on trends forecast by national policies as well as on trends appearing in international or bilateral agreements. I hope a treaty section in libraries will become commonplace in the future.

NETWORKING THROUGH FISHLINE: STATE-OF-THE-ART OF LIBRARIANSHIP IN DENMARK

Mogens Sandfaer, Librarian
Danish Institute for Fisheries
and Marine Research

Following a decade of increasing difficulties, the libraries of the Danish Institute for Fisheries and Marine Research together with other Danish fisheries research institutions have engaged in a common project of reorganization and automation. Based upon the fundamental ideas of networking and international standardization, the project has as its main feature a shared online catalog, called FISHLINE. In time this should become an almost complete representation of fisheries science documents located in Denmark. The system is based on a central minicomputer tied up with several local microcomputers, used for input as well as retrieval. Input features Marc-cataloging and ASFIS-indexing. The paper gives a brief outline of some of the achievements and ideas of the reorganization project.

INTRODUCTION

The past decade of Danish fisheries research has been characterized by an increased growth in the traditional areas of investigation as well as an emergence of new areas of scientific research and technological development.

The introduction of exclusive economic zones and quota regulations has increased the need for accurate management of fisheries and fish resources. Futhermore, the need for alternatives to the traditional sea fisheries such as fish and shellfish culture has increased. Thus the economic and political importance of fisheries research has been in focus, which has increased governmental funds and brought onto the scene new sources of finance, such

as The Commission of The European Common Market in charge of fishery regulations of the member states.

The number of research institutes within the fisheries sector has grown as has the size of the old institutes like the Danish Institute for Fisheries and Marine Research(DIFMAR). A brief description of the research sector is given in Appendix 1.

DIFMAR has roots back to the very start of organized Danish fishery investigations in the 1880's, but was formally established by a merger in 1952 of the Danish Biological Station and several laboratories run by the Commission for Danish Fisheries and Marine Research. Thus the present publication series of DIFMAR was initiated in 1904. As they have been subject to extensive title and author changes, a plan of the publication pattern is given in Appendix 2.

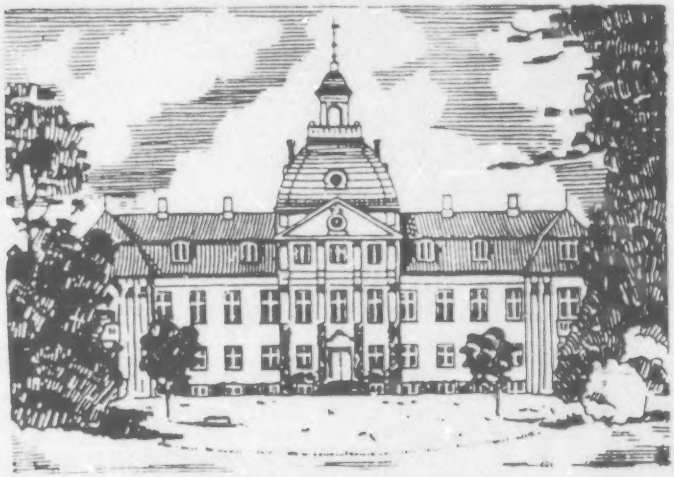
The present library collections of DIFMAR likewise date back to the turn of the century and the older stock is characterized by inclusions from the annexed laboratories. Furthermore, large parts of the collections from the Dana Expeditions of the Carlsberg Foundation have been included. Thus the subject and geographical coverage seem to be very fine for older material; and research directories of the early 1960's emphasize the fine library facilities.

But sometime in the late 1960's or early 1970's the library went off the track. Probable factors are the information explosion combined with the fact that the position of librarian at that time was a post of retreat for senior scientists, which for natural reasons produced a series of rather short careers. In any case, things gradually went out of control during the 1970's, and by 1980 the library

service was quite unsatisfactory.

This was (and still is, to some extent) a problem especially for the many younger scientists and those taking up new areas of research; while the well-established scientists research areas managed through their widespread international contacts. The background for these contacts has been the institute's position in areas such as multispecies modelling and the very close ties to the International Council for the Exploration of the Sea (ICES), which has been located in Denmark since the start in 1902 and just recently moved from the castle in Charlottenlund.

However the problem is not only internal. As the fishery sector's largest research library, the DIFMAR Library maintains the position as central library for the fishery sciences in the national system of research libraries.



Charlottenlund Castle

The external demand for library service has grown rapidly with the emergence of new institutes, research groups, university courses, industries and general public interest in our area, and so has the external dissatisfaction.

As a result of this, a project of library reorganization, supported by the Ministry of Education, was inititated at DIFMAR in 1982. Through contacts to the University of Aalborg, which was in the process of acquiring an online catalog system and starting up a new educational program for fisheries engineers, the idea of an online union catalog for fisheries libraries emerged and national cooperation became a main feature of the project.

The following gives a brief outline of some achievements and ideas of the reorganization project.

THE ONLINE UNION CATALOG

The main object of the catalog project is to provide a fundament for a network of Danish fisheries libraries, where the collected stocks can be exploited easily by any member of the network and duplicate accessions should become almost superfluous.

Participating Libraries

At present the libraries of the following institutions take part in the project: the Technological Laboratory of the Ministry of Fisheries (TLMF), the Danish Institute of Fisheries Technology (DIFT), the North Sea Museum (NSM), Aalborg University and DIFMAR.

As the locations of these libraries are spread all over the country, the online catalog will help to overcome the geographical distance between the libraries and, furthermore, give access to the network from almost any corner of the country. The main locations of the

FIGURE 1

Locations of the DIFMAR Library

DIFMAR Library alone can be seen in Fig. 1.

In the future it would be natural to include what remains of fisheries collections in research institutes, university libraries, etc.

As host of the database the Aalborg University Library has the responsibilities for and the practical task of maintaining the hardware and system.

Structure and Interface to Other Danish Online Catalogs

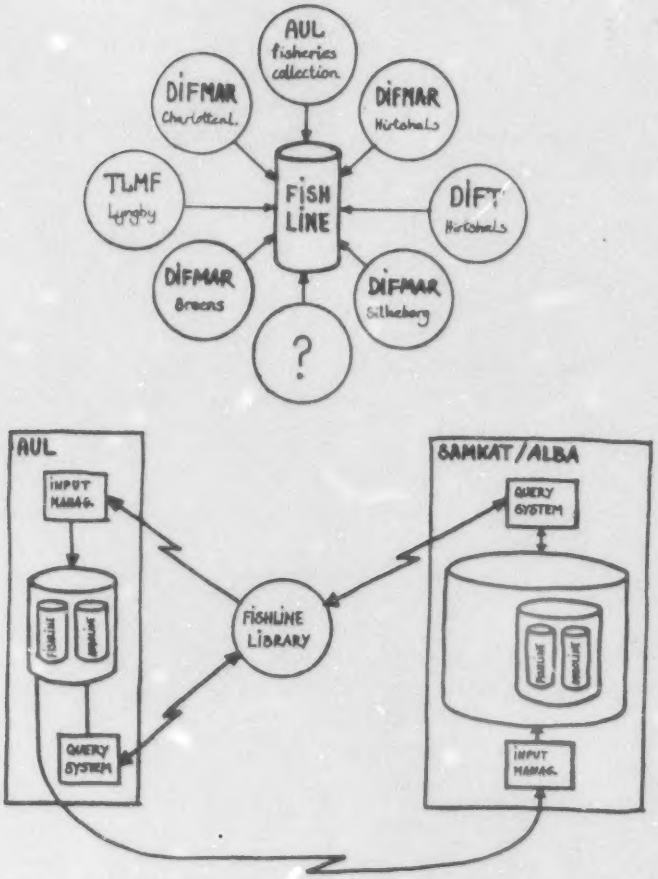
The catalog database, called FISHLINE, is divided into a number of logical files, one for each of the participating libraries' monographical input, and one for serials cataloging. The computer which is at Aalborg University Library (AUL) also hosts AUBOLINE, which is the catalog of the entire university library. AUBOLINE and FISHLINE can be searched simultaneously extending FISHLINE with references to the collections of a university library.

These two databases are furthermore loaded into SAMKAT/ALBA, the database of the national Danish research libraries common cataloging project. In this context FISHLINE can be searched by any Danish library, although not with the same query facilities as FISHLINE offers, as the object of SAMKAT/ALBA is mutual re-use of catalog records and easy location of books and journals in Danish research libraries. These relations are displayed in Fig. 2.

Together with AUBOLINE it is planned to open FISHLINE for public access on a small scale during 1985 and then gradually build up the capacity for external use. Further on, as the new Danish packet-switched data-communications network is fully implemented, the plans are to link all library systems in Denmark together. This should enable the

FIGURE 2

Structure of the FISHLINE Database



user to search all computers/databases in one operation.

Hardware

The central configuration at AUL consists of an RC-8000 24 bit mini/midi-computer (128K), two 248 MB disc drives and a tape-station, all furnished by RC Computer of Denmark.

The distributed equipment consists of RC-700 8 bit microcomputers (Z80A-microprocessor, 64 KB RAM) with double 8" floppy drives (2 x 0.9 MB) and OKI Microline 84 matrix-printers with high speed serial interfaces. Presently 5 configurations of this kind are in operation.

At present communications are handled through dial-up connections and 1200 bps modems.

Software

The software is the RC Library System likewise furnished by RC Computer and sold as a turn-key system. However, as we were amongst the first to purchase the system, quite some time was spent waiting for program modules, finding errors, specifying necessary alterations, etc.

The system is basically an information retrieval system (inverted file) with added modules for microcomputer-cataloging, etc. The following modules are still under development: circulation control, accession, periodicals check-in, administration and statistics.

Query Language

The query language is based upon the European Common Command Language (CCL) and is thus very close to being in accordance with the emerging ISO-standard. It features practically the same facilities as well known systems such as Lockheed's Dialog, and for

those familiar with the German database hosts, it behaves much like the GRIPS-DIRS of DIMDI, for example.

Cataloging Rules

In order to follow international standards and for the FISHLINE-records to be compatible with the AUBOLINE-records and also be acceptable for the SAMKAT/ALBA system, we chose to follow the Danish version of the Anglo-American Cataloging Rules (AACR) and the International Standard Book Description (ISBD). This has furthermore given us the possiblility of reusing other libraries' catalog-records as they can be retrieved, downloaded, edited and transmitted for input into FISHLINE. This aspect is even more interesting as the catalog-records of the Library of Congress and the British National Bibliography (LC-Marc and BNB-Marc) are loaded into the SAMKAT/ALBA database. On the other hand, AACR certainly is not ideal for online catalogs because of the mass production of redundant data and the time-consuming but utterly irrelevant rules for choice of heading.

Indexing

For description of the subject content of the recorded documents, we chose to use the ASFIS indexing system and not the Universal Decimal Classification System (UDC), which would have been the traditional choice for a Danish science and technology library. The systems had in common that they were international and that the use of the systems was well documented. However, we found that ASFIS indexing had several advantages:

- It was tailored for online retrieval systems in direct contradiction to UDC, which only in part would allow us to exploit the advan-

tages of online subject searching.

- It was naturally much better in the area of fisheries science.
- It was also the indexing system of what had become our most popular external database, ASFA. This would allow us to use the same search profile without reformulating in ASFA as well as FISHLINE.
- The experience we would gain by using the ASFIS indexing system would improve our search strategies when searching ASFA.
- This experience would also be an advantage if we were to start as a Danish input center to ASFA.

Although it probably is too early to draw any conclusions, certain difficulties have already shown. One, for instance, is the problem of establishing a uniform and satisfactory indexing level for books, as they normally represent broader and more numerous concepts than articles and reports. Furthermore, we have had to amend the system of Subject Category Codes with codes for our general literature (i.e., whatever falls outside the scope of ASFA).

Input format

For choice of format, the same considerations apply as mentioned in choice of cataloging rules.

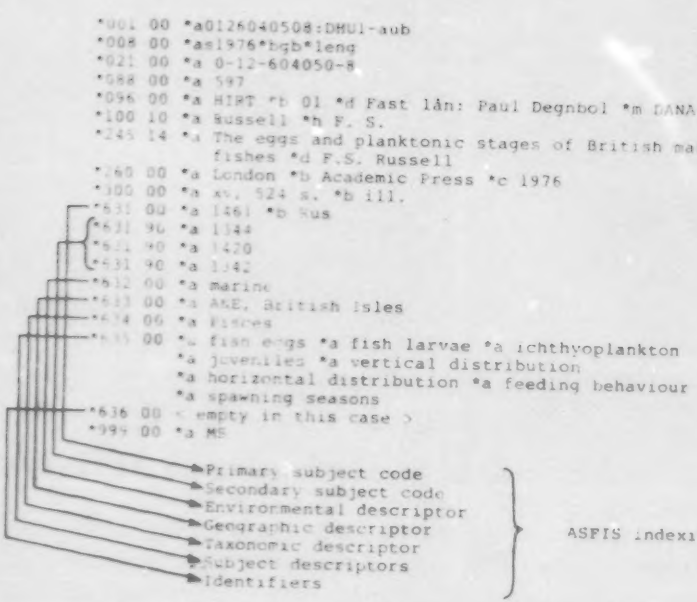
The chosen format is the Danish version of the international Marc-format, called Dan-Marc. This format, however, is far too complex for our purposes as it, like AACR, mainly is aimed at extremely refined book- or card-catalogs.

What we have done, then, is to restrict our usage of the format facilities and to define fields for the ASFIS indexing terms. As it can be seen in Fig. 3, we chose the fields 631-636 for the 6 categories of indexing terms:

BEST COPY AVAILABLE

FIGURE 3

Input Format


*001 00 *a0126040508:DHU1-aub
*008 00 *as1976*bgb*leng
*021 00 *a 0-12-604050-8
*088 00 *a 597
*096 00 *a HIRT *b 01 *d Fast lån: Paul Degnbol *m DANA
*100 10 *a Russell *h F. S.
*245 14 *a The eggs and planktonic stages of British marine fishes *d F.S. Russell
*260 00 *a London *b Academic Press *c 1976
*300 00 *a xv, 524 s. *b ill.
*631 00 *a 1461 *b Rus
*631 90 *a 1344
*631 90 *a 1420
*631 90 *a 1342
*632 00 *a marine
*633 00 *a ANE, British Isles
*634 00 *a Fishes
*635 00 *a fish eggs *a fish larvae *a ichthyoplankton *a juveniles *a vertical distribution *a horizontal distribution *a feeding behaviour *a spawning seasons
*636 00 < empty in this case >
*999 00 *a MS
Primary subject code
Secondary subject code
Environmental descriptor
Geographic descriptor
Taxonomic descriptor
Subject descriptors
Identifiers
ASFIS indexing

subject category codes, environmental descriptors, geographic descriptors, taxonomic descriptors, subject descriptors and uncontrolled terms (identifiers).

When assigning identifiers in areas like fishing vessel construction and food science, we use the Ship Abstracts Thesaurus and the Food Science and Technology Abstracts Thesaurus, respectively.

How It All Works

In order to provide some idea of the practical side of the system, an example of the input routine is given:

1) The microcomputer is loaded with the cataloging software, providing communication facilities as well as stand-alone editing and syntax control.

2) Connection is made to the SAMKAT/ALBA database, which is searched in order to find already existing catalog-records (from other Danish research libraries, the Danish National Bibliography, LC or BNB). If this is successful, the most suitable record is chosen and downloaded in the Marc-format.

3) The micro is switched to stand-alone mode, and the record is edited in accordance with FISHLINE conventions. In case the search in SAMKAT/ALBA was unsuccessful, the item is cataloged from scratch. As editing/cataloging is concluded, the record is saved on disc and printed out to enter the indexing routine.

4) The item is indexed according to ASFIS rules, indexing terms being noted on the printout. This step might include an ASFA-search normally using the host DIMDI in Cologne.

5) Still with the micro in the stand-alone editing mode, the indexing terms are entered and saved on disk. By now, the record should be complete and correct as the micro-software takes care of quite a lot of the validation. The micro is then switched to online mode, connection to FISHLINE is established, and the record is transmitted to the FISHLINE host computer at AUL. This concludes the FISHLINE-library input routine.

6) At AUL the record is run through the various input management routines (validation, indexing, etc.) and at least by the next day, the record is fully searchable for any FISHLINE library.

7) Approximately once a week the new, cor-

rected or deleted FISHLINE records are transmitted and loaded into the SAMKAT/ALBA system. As connections are still dial-up and terminal capacity is limited, we receive, for the time being, weekly catalog card printouts from SAMKAT/ALBA for trivial catalog use, such as finding the shelf mark of a well known book, etc.

Provisional Conclusions

The union catalog aspect of the online project has initiated a much needed cooperation between Danish fisheries libraries that was completely lacking just two years ago. This together with the indisputable advantages of a union catalog itself should be viewed in context with the effort it takes to reach the necessary compromises, the time-consuming traveling to and from innumerous meetings, the mountains of paper, etc.

If the project were to be evaluated merely as a means of cataloging the collections of DIFMAR or any of the other fisheries institutions, I am not sure that we could not have done it quicker and more rationally in some other way. However, we have now become a member of an emerging fisheries network and also a member of the Danish research library community; thus the importance of this extends beyond cataloging.

The RC Library System, or the parts of it we know today, is a very capable and flexible software package for this task. All kinds of parameters can be trimmed in order to make the system suitable for the demands of the medium sized institute library or the largest university or national libraries. However, it is necessary for the library to have at least one computer-trained employee even though the furnisher sometimes provides sufficient documentation.

What we didn't know, was that we were to play a role in the development of the system, which, of course, has taken a lot of time, but also has given us lots of experience in configuring information retrieval systems. The system is also used by other Danish research libraries like the University Library of Aarhus and others are to come.

OTHER ACTIVITIES

The reorganization of the DIFMAR Library has, of course, other aspects than union cataloging. These are, however, mostly of a more trivial nature such as setting up new accession and exchange procedures and generally cleaning up and rearranging the stacks, etc.

It could be of interest, however, to mention our library at the newly established North Sea Centre in Hirtshals. All the participating institutions of FISHLINE are represented in the center and rather than having several small libraries on the premises it was agreed to run a common library function. This can be seen as one of the indirect accomplishments of the union cataloging project.

As the library is no older than the union catalog, all materials can be searched online. The library features another interesting use of the ASFIS system as the books are shelved according to the primary Subject Category Code of the ASFIS indexing. Thus the shelving is analogous to the way the entries are arranged in the printed version of ASFA.

The codes 0-999 are used for our general literature (the part that falls outside the scope of ASFA) and have been inspired by the main divisions of UDC. 1000-1999 cover the scope of ASFA1 and 2000-2999 the scope of ASFA2.

As literature becomes more abundant in

Hirtshals, this solution can be evaluated thoroughly, although it already seems that in comparison to the ASFA database consistency is much more critical in our case.

APPENDIX # 1

THE MAJOR DANISH FISHERY RESEARCH INSTITUTIONS

The Danish Institute for Fisheries and Marine Research
(Danmarks Fiskeri - og Havundersøgelser, DF&H)

The national agency for research in the field of fishery biology including fish pathology and aquaculture and with special reference to fish stock assessment. The institute was founded in 1889 and acts as the Danish national agency for governmental expertise in fishery biology. Fish stock assessment in marine waters is generally carried out in international cooperation normally coordinated through the International Council for the Exploration of the Sea (ICES). This organization also coordinates the activities in hydrography, etc. Research vessels are Dana, Havfisken, Havkatten and Havmusen.

Personnel: 150

Main location: Copenhagen (Charlottenlund Castle)

Secondary locations: Hirtshals (North Sea Centre), Silkeborg, Brøns, and several smaller laboratories.

Publishes: **Dana** (English language scientific journal)
Fisk og Hav (Danish language popular journal)
DF&H-rapport (Mixed language report series)
Arsberetning (Danish language annual report)
Occasional papers

In the national system of research libraries, DF&H maintains the function as central library

for the fishery sciences. Thus it is the largest library in this field in Denmark. Administration and main collection in Copenhagen and secondary collections in Hirtshals and Silkeborg. The entire library, information and documentation function is presently in the process of reorganization.

Library
Danish Institute for Fisheries and Marine Research
Charlottenlund Castle
DK-2920 Charlottenlund
DENMARK

Tel: (01) 62 85 50 Telex: 19960 dfh dk

Contact: **Mogens Sandfaer**

The Technological Laboratory of the Ministry of Fisheries
(Fiskeriministeriets Forsøgslaboratorium, FF)

The national agency for research in the fields of fish handling, storage and processing of fish products. Furthermore, the institute is responsible for education at the Technical University of Denmark in the institute's research fields.

Personnel: 40

Main location: Lyngby (on the premises of the Technical University of Denmark)

Secondary location: Hirtshals (North Sea Centre)

Publishes: **Arsberetning** (Danish language annual report)
Occasional papers

Within the working area of the laboratory, the library holds the most comprehensive collection in Denmark.

Library
Technological Laboratory of the Ministry of Fisheries
Technological University of Denmark
Building 221
DK-2800 Lyngby
DENMARK

Tel: (02) 88 40 60 ext. 3521

The Danish Institute of Fisheries Technology
(Fiskeriteknologisk Institut, FTI)

Performs research on a commercial basis in the field of catch technology. The institute was founded in 1981 and became operational late in 1982. The main activities are centered around a flume test tank for fishing gears.

Personnel: 14

Location: Hirtshals (North Sea Centre)

Publishes: Occasional papers

Operates a Documentation Department that functions as a private information broker. The library is building up a collection of catch technology literature with emphasis on grey literature. The library is run in cooperation with DF&H.

Documentation Department
Danish Institute of Fisheries Technology
North Sea Centre
DK-9850 Hirtshals
DENMARK

Tel: (08) 94 43 00

Aalborg University

A relative newcomer in the field of fishery research, with a recently established program in fisheries engineering.

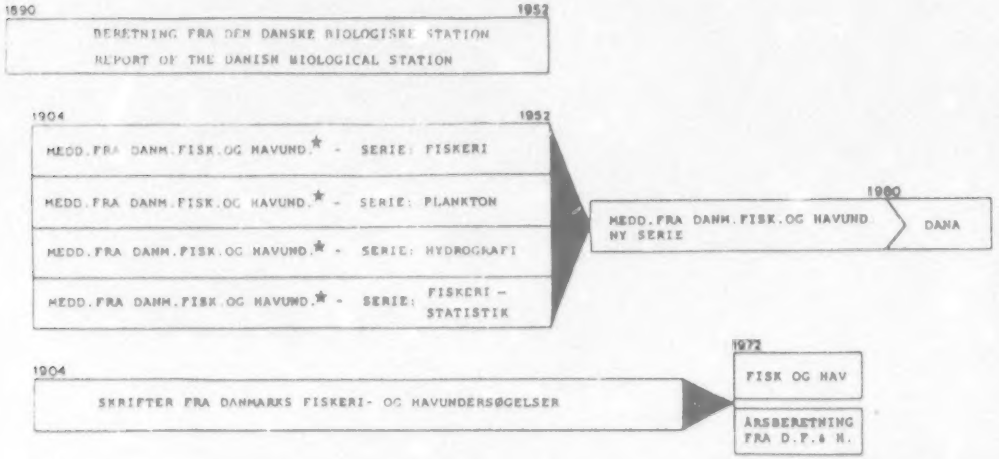
Thus the library (Aalborg Universitetsbibliotek, AUB) is building up a core collection of fishery science literature. Apart from that, AUB is one of the largest and most modern research libraries in Denmark. As AUB acquired their online catalog system collaboration with the fishery research institutions was initiated. Within this system the FISHLINE database functions as the common online catalog of the above mentioned libraries.

Aalborg University Library
Langagervej 4
Postbox 8200
DK-9220 Aalborg Øst
DENMARK

Tel: (08) 15 91 11 Telex: 69790 aub dk

APPENDIX # 2

PLAN OF THE PUBLICATIONS OF THE DANISH INSTITUTE FOR FISHERIES AND MARINE RESEARCH AND ITS PREDECESSORS



* The name of the publisher has varied somewhat through the years.
From 1904: Kommissionen for Havundersøgelser.
From 1926: Kommissionen for Danmarks Fiskeri- og Havundersøgelser.
From 1952: Danmarks Fiskeri- og Havundersøgelser

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THE SHIP'S LIBRARY:
A SEAFARING SPECIAL LIBRARY

Carolyn P. Winn, Research Librarian
Woods Hole Oceanographic Institution

Life on board ship is rigorous, often tedious and is lacking in individual privacy. Scientists and ship's crew use the recreational reading materials to while away off-duty hours, to escape the constriction of close quarters and to develop skills in their hobbies. The scientific section of the library provides the scientist with reference books and the student with a study collection. The nonscience reference materials contain sources for settling after-dinner arguments, organizing group discussions and pursuing self-education projects. Shelf space is limited. Therefore, selection of books for the collection is based on expressed needs and requires continuing communication between crew, sea-going staff and the librarian.

The Woods Hole Oceanographic Institution operates three major research vessels and one submersible. These ships are:

R/V Knorr - Length, 245 feet. Complement: 25 officers and crew, 24 scientists.

R/V Atlantis II (Mother ship for DSRV ALVIN) - Length, 210 feet. Complement: 25 officers and crew, 15 scientists, 10 ALVIN crew.

R/V Oceanus - Length, 177 feet. Complement: 12 officers and 12 scientists.

Each of these ships contains, as a separate unit, a library maintained by the Institution Research Librarian. The research vessel's mission is to increase man's knowledge of the oceans of the world. The ship's library contributes to that mission by providing on-site information to scientists, technicians, ships' officers and crews. It serves a small group

of people who are isolated from the sources of information that are taken for granted in the home institution. The librarian needs to understand the requirements of shipboard life in order to achieve the objective of providing the maximum amount of information in a minimum amount of space.

Oceanographic research vessels are ships designed to accommodate a wide range of oceanographic tasks. The duration of a cruise varies from one month to two years. Each leg of a cruise may serve a different set of scientific investigations carried out by a separate scientific and technical group. The ship's crew remains approximately the same throughout a cruise. The ship's library has two main components: the scientific section and the general reference/recreation section. The contents of the scientific/technical portion of the ship's library will vary according to scheduled scientific projects, the geographic area of the cruise, and the specialized capabilities of the ship. Ship equipment, mechanical and electronic, must be repaired and maintained at sea. Scientific instrumentation is often modified at sea. The library collection is expected to provide certain basic handbooks to assist in these processes. The reference/recreation portion of the library can be tailored to the individual interests of the officers and crew, and the general interests of the scientists and technicians. Interviews with the ship's officers and crews, and with regular sea-going scientific and technical staffs are essential to the development of a meaningful library collection.

All shipboard activities are directed toward oceanographic research. The deployment and retrieval of scientific equipment place rigorous demands on personnel and ship. There is

no time for questions or explanations when the ship is on-station. Between stations, the scientific/technical personnel are heavily involved in laboratory work. The ship's crew frequently request library materials that will explain oceanography in general or specific research projects. In order to do their jobs better, the crew members like to understand why a certain piece of equipment must be deposited at a specific location, in a certain manner and also the value of the data or specimens being collected. Many members of the ship's officers and crew are career seamen and may be studying to meet license or certificate requirements.

Life on board ship is restricted in space and variety. For the officers and crew the ship is home; for the scientific/technical staff the ship is a temporary laboratory that may represent an adventure, or an endurance test if they are afflicted with seasickness. There may be long periods of inactivity while the ship is steaming to the research site. The close contact between diverse shipboard personnel puts a strain on human relationships. Reading provides the individual with an escape from the physical constraints and gives him a personal inner space in which to expand his internal horizons. The recreational portion of the library collection includes both fiction and non-fiction. No distinction can be made between the reading interests of crew and scientific staff. Their mutual love of the sea is apparent in the popularity of any book about the oceans - maritime history, classic tales, modern sea stories and factual accounts of ocean exploration.

A basic ship's library list is appended here, arranged by categories, with some recommended titles. For a specific ship, additions

or changes to the basic list should be made in response to needs imposed by the geographic areas of the cruises.

SHIP'S LIBRARY - BASIC

Encyclopedias

GENERAL

Encyclopedia Britannica (see also: Treatises)

SCIENCE

Example:

McGraw-Hill Encyclopedia of Science and Technology. 15 Vol. 5th edition. 1982.

The Encyclopedia of Oceanography. R.W. Fairbridge. Reinhold. 1966.

Dictionaries

ENGLISH LANGUAGE

SCIENCE

Example:

Ocean and Marine Dictionary. D.F. Tver. Cornell Maritime. 1979.

The VNR Dictionary of Ships and the Sea. J.V. Noel. VanNostrand Reinhold. 1980.

Glossary of Oceanographic Terms. 2nd edition. U.S. Naval Oceanographic Office. 1966.

FOREIGN LANGUAGE

General - choice based on ports of call

Science

Thesaurus

Record of Institution Work (for ships which visit foreign ports)

Atlases - Political and Oceanographic

Example:

Times Atlas of the Oceans

National Geographic Atlas of the World

Oceanographic atlases for the cruise area

Handbooks

DATA COMPILATIONS

Example:

CRC Handbook of Chemistry and Physics

Handbook of Mathematical Functions with Formulas, Graphs and Mathematical Tables. M. Abramowitz and I.A. Stegun. GPO. 1978. (7th printing)

Handbook of Oceanographic Tables. U.S. Naval Oceanographic Office. 1966.

A Manual of Chemical and Biological Methods for Seawater Analysis. T.R. Parsons et al. Pergamon Press. 1984.

Handbook of Ocean and Underwater Engineering. J.J. Myers and C.J. Holm. McGraw-Hill. 1969.

Mark's Standard Handbook for Mechanical Engineers. T. Baumeister. 8th edition. McGraw-Hill. 1978.

Reference Data for Radio Engineers. SAMS. 6th edition. 1975.

Buchsbaum's Complete Handbook of Practical Electronic Reference Data. 2nd edition. Prentice Hall. 1978.

Brown's Nautical Almanac. 107th edition. International Publishing Service. 1984.

Health (see also: Toxic Animals under Identification Manuals)

Example:

Ship's Medicine Chest. GPO (latest edition)

Merck Manual. Vol. 1. General Medicine

NOAA Diving Manual

Seamanship/Navigation

Example:

Dutton's Navigation and Piloting. 13th edition. Naval Institute Press. 1981.

American Practical Navigator. N. Bowditch. 2 vol. GPO. 1981.

Mariner's Guide to the Rules of the Road. 2nd edition. Naval Institute Press. 1982.

Seamanship: A Handbook for Oceanographers. C.H. Blair. Cornell Maritime. 1977.

Piloting, Seamanship and Small Boat Handling. C.F.

Chapman. 1945.

Knight's Modern Seamanship. 16th edition. VanNostrand. 1981.

Merchant Marine Officer's Handbook. 4th edition. Cornell Maritime. 1965.

American Merchant Seaman's Manual. 6th edition. Cornell Maritime. 1981.

Meteorology/Weather

Example:

Marine Observer's Handbook. 10th edition. HMSO. 1977.

Meteorology for Mariners. 3rd edition. HMSO. 1978.

Smithsonian Meteorological Tables. 6th revised edition. 1958.

Weather for the Mariner. W.J. Kotsch. 3rd edition. Naval Institute Press. 1983.

Cloud Types for Observers. 2nd edition. HMSO. 1983.

Treatises

Example:

The Sea. 8 vol. Wiley. 1962-

Chemical Oceanography. J.P. Riley and G. Skirrow. 2nd edition. 8 vol. Academic. 1975-

Ocean Basins and Margins. A.E.M. Nairn and F.G. Stehli. 4 vol. Plenum. 1973-

Monographs/Textbooks

Example:

The Oceans. H.V. Sverdrup et al. Prentice Hall. 1966.

Oceanography. A View of the Earth. M.G. Gross. Prentice Hall. 1972.

Introductory Dynamical Oceanography. S. Pond and G.L. Pickard. 2nd edition. Pergamon. 1983.

Applied Oceanography. J.M. Bishop. Wiley. 1984.

Introduction to Physical Oceanography. J.A. Knauss. Prentice hall. 1978.

Manned Submersibles. R.F. Busby. GPO. 1976.

Acoustical Oceanography. C.S. Clay. and H. Medwin. Wiley. 1977.

Principles of Underwater Sound. R.J. Urich. 2nd edi-

Introduction to Oceanography. D.A. Ross. Prentice Hall. 1982.

tion. McGraw-Hill. 1967.

Underwater Photography. P.F. Smith. VanNostrand Reinhold. 1984.

Buoy Engineering. H.O. Berteaux. Wiley. 1976.

Marine Geology. J.P. Kennett. Prentice Hall. 1982.

Deep Drilling Results in the Atlantic Ocean. M. Talwani. 3 vol. AGU. 1977-1979.

Ecology of Marine Sediments. J.S. Gray. Cambridge U.P. 1981.

Basic Marine Biology. A.A. Fincham. 1984.

Marine Botany. E.Y. Dawson. Wiley. 1966.

Biological Oceanographic Processes. T.R. Parsons and M. Takahashi. 3rd edition. Pergamon. 1984.

Open Sea: The World of Plankton. A.C. Hardy. Collins. 1956.

Deep Sea Biology. G.T. Rowe. Wiley. 1983.

Experimental Biology at Sea. A.G. MacDonald and I.G. Priede. Academic. 1984.

Life of Invertebrates. W.D. Russell-Hunter. Macmillan. 1979.

Identification Manuals

Specialized manuals are provided by the scientists for use in the laboratory only. The library collection emphasizes those animals encountered at sea by all shipboard personnel: seabirds, whales, fish and large invertebrates. Additional manuals are selected by geographic area of the cruises.

Example:

American Seashells. 2nd edition. R. Tucker Abbott. VanNostrand Reinhold.

Dangerous Marine Animals That Bite, Sting, Shock, Are Non-edible. 2nd edition. B. Halstead. Cornell Maritime. 1980.

Atlas of Dangerous Aquatic Animals of the World. Darwin Press. 1985.

Toxic Fish and Molluscs. E. Keane. GPO. 1979.

Fishes of the World. J.S. Nelson. Wiley. 1976.

Underwater Guide to Hawaiian Reef Fishes. J.E. Ran-

Whales, Dolphins and Porpoises of the Western North Atlantic. S. Leatherwood et al. NOAA. 1976.

dall. Harrowood. 1981.

Seabirds. J. Fisher and R.M. Lockley. Collins. 1954.

Seabirds, An Identification Guide. P. Harrison. Houghton-Mifflin. 1983.

Whales, Dolphins and Porpoises. K.S. Norris. University of California Press. 1966.

Recreational Book Collection

NONFICTION

TRAVEL GUIDES - selected by port of call

GENERAL INFORMATION

Example:

World Almanac

Book of Lists

Guinness Book of World Records

Sports encyclopedias/compendia

ROPES AND KNOTS

Example:

The Ashley Book of Knots. C.W. Ashley. Doubleday. 1944.

The Art of Knots. A Sailor's Handbook. M.P.G. Bertheir. Doubleday. 1977.

OCEANS (see also: Monographs and Textbooks)

Example:

Continents Adrift and Continents Aground. Readings from Scientific American. J.T. Wilson. W.H. Freeman. 1976.

Edge of an Unfamiliar World. A History of Oceanography. S. Schlee. Dutton. 1973.

Edge of the Sea. R. Carson. Houghton-Mifflin. 1979.

Into the Deep. The History of Man's Underwater Exploration. R.F. Marx. VanNostrand Reinhold. 1978.

Oceanic Quest. The International Decade of Ocean Exploration. NAS-NRC. 1969.

Living and Working in the Sea. J.W. Miller and I.G. Koblick. VanNostrand Reinhold. 1984.

Oceanographic Ships Fore and Aft. S. Nelson. GPO. 1971.

Restless Oceans. A.B.C. Whipple. Time-Life Books.

1984.

Seas in Motion. F.G.W. Smith. Crowell. 1973.

Tales of an Old Ocean. T. VanAndel. Norton. 1977.

HOBBIES

Most popular areas of interest are macrame, woodcarving and scrimshaw.

MUSIC

Harvard Concise Dictionary of Music. D.M. Rendel. Belknap. 1978.

NAVAL AND MARITIME HISTORY

RELIGION-BIBLES

FICTION

The most frequently requested recreational reading materials fall into the following categories:

CLASSIC TALES OF THE SEA

Example:

Moby Dick. H. Melville

Two Years Before the Mast

The works of Joseph Conrad

OTHER SEA STORIES

Example:

The Captain Hornblower series

MYSTERIES fast-paced, adventure-packed type

SCIENCE FICTION

SPY STORIES

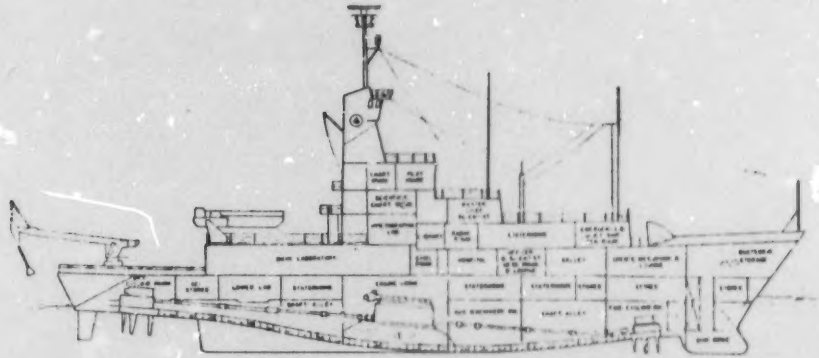
WESTERNS

BIBLIOGRAPHY

Bernard, H.R. and P.D. Killworth. 1974. Scientists and crew: a case study in communications at sea. (with an appended report by Ann Collins). Technical Report. BK-103-74. NTIS. AD 776 629/8GA 29 p.

Bernard, H.R. and P.D. Killworth. 1976. Scientists and mariners at sea. MTS Journal 10(3): 21-30.

Inboard Profile



202

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R/V Knorr

ities, and other enhancements. Therefore, you can acquire a microcomputer that will expand with you as your needs increase.

- are sometimes transportable. My home computer can travel with me because it folds up and fits under a standard airline seat. New "lap" computers that can fit into a briefcase are becoming popular. Even most desktop microcomputers can be moved (with great care) from one desk to another, or placed on a cart that may go from room to room. Try that with a minicomputer!

- are usually cheap. My home micro which does most everything I need cost less than $2,000, including software and a modem. Multi-user, multi-task microcomputer workstations usually cost less than $6,000. You cannot even talk to a minicomputer salesperson for less than $20,000.

- micros can run many applications programs, and more programs are being developed every day. If the program you need to perform a function is not yet developed and there are at least two people looking for it, it will be developed soon.

WHAT CAN I USE A MICROCOMPUTER FOR IN A LIBRARY?

First, let's look at the microcomputer in a managerial function. Software abounds for budgeting. "Spreadsheets," as they have become to be known, can be structured by horizontal and vertical columns to represent budget categories (salaries, books, supplies, etc.) and time divisions (weeks, months, quarters, etc.). Many spreadsheets allow you to input formulas that will automatically calculate a column or columns. Then, when a figure must

be revised, the new number is entered, a command given, and any other number related by formula to the revised number is recalculated. Hours (and maybe jobs) are saved with this capability.

Another managerial chore we all face is reports. It seems every time I turn around someone wants another report, usually for the same information, but in a different format. Word processing programs are very useful in this function. An existing text file may be revised or updated with little effort. "Typos" can be easily handled and the text printed minutes later. Form letters can be done once and then processed hundreds of times with individualized addresses and salutations.

A third managerial function includes listings maintenance. Almost everyone keeps a file of addresses or phone numbers or other lists referred to daily or weekly, but too large to memorize. A database management program enables you to develop a file with records structured to include information on addresses, telephone numbers, and other data that can be indexed on several file lines. For example, you may have a file with the addresses and names of all the vendors you use. One of the file lines may include information about what type of materials the vendor provides, such as monographs, government documents, music, or serials. Then if you want to send a letter to all the music vendors you deal with concerning the need for a particular album, the database can be used to list only those specific vendors, rather than having to go through the entire vendor list.

Database management and other programs can also be used for library functions. Several software programs exist for serials control using a microcomputer. A few librarians are experimenting with developing online catalogs

using microcomputers that will eventually replace maintaining the card catalog. Here in Massachusetts well over twenty libraries are using microcomputers for producing catalog cards cheaper than with a typewriter.

All of the functions described above are conducted internally. However, one of the more productive features of a microcomputer includes its capability to communicate with databases and computers external to the library. Using the microcomputer for communications creates a gateway to the world. For example, a microcomputer with the appropriate hardware and software can be used to access remote databases of specific subject files such as the files on DIALOG. You can have access to hundreds of subject indices (such as Chemistry Abstracts or ERIC) online via a micro that you could not afford to purchase or store. In Massachusetts we are experimenting with micros for small libraries to provide dial-up access to the large bibliographic databases on automated circulation control systems which will provide the librarian, and eventually the library user, with information on which library owns a specific title, and whether or not the book is in or checked-out to another user. In another example, Massachusetts' librarians are considering using microcomputers for electronic mail. Rather than sending an interlibrary loan request through the mail, each library would have an "electronic mailbox" to which they could send and receive messages via their microcomputer, saving valuable time and money.

A WORD OF CAUTION...

Microcomputing can be addictive. A person could literally spend months and years considering which program or computer to purchase, always looking for the "best" program, computer

or deal. Please understand two considerations. First, whatever software or hardware you acquire will soon be obsolete. It is only a matter of time before another computer software company or manufacturer offers a "better" or "improved" or "more powerful" program or computer that makes yours look pale in comparison. There is nothing you can do about that. Microcomputer technology is moving too fast for any program or computer to be "state of the art" for longer than twelve months. Secondly, once you think your software or hardware is obsolete, the "grass is always greener" syndrome will strike. You become jealous of every new product that makes yours seem less and less up-to-date. You become envious of colleagues and friends acquiring the "newest" program or computer. Don't fall for it! Their acquisitions will soon be obsolete as well. As long as your software and hardware works, make every effort to curb this frustration. It will only cause you to frequent computer stores and read hundreds of microcomputer magazines instead of sailing.

AND NOW FOR SOMETHING COMPLETELY DIFFERENT...

Prior to this discussion, Carolyn Winn presented a program concerning the ship's library. I listened closely and learned a great deal about a subject I had not thought of before. Therefore, I would like to take this opportunity to briefly discuss the potential impact of emerging technologies as I see it on the ship's library.

Carolyn's presentation made two important points. First, everyone on ship, whether steward, student or scientist, has a need for information. This need includes technical material such as navigational guides, and personal

material such as recreational reading or travel guides for ports of call. Secondly, because of the lack of space on a ship, the librarian must carefully choose the contents of a ship's library.

I wish I had a videotape of Carolyn's presentation to show to librarians. Every person has a need for information, and it is part of the library's mission to attempt to meet those informational needs. No library, no matter how well-managed or funded, can meet all the needs of their patrons on demand. For instance, what happens if a crew member has a need for a particular item which is not on board? New technologies that can be used in providing timely information will have an impact on libraries and their users in the very near future.

One of the problems many libraries encounter is the lack of space to shelve the materials acquired or desired. We are trying to address this problem of providing information for our users by using new formats capable of storing vast quantities of information more efficiently and effectively. One such format is videodisk which can store color prints and text. An example would be that many of the most reputable studies of birds, including color prints, could be stored on a videodisk. The user could access (using a small built-in microprocessor or attached microcomputer) the disk's contents using a specific name index, or browse through the disk's contents as they would a book. One videodisk the size of a music album can store a set of encyclopedias. Imagine the space savings!

Another solution involves communications such as we discussed earlier. If the librarian could not find a desired item in his/her collection, he/she could use a microcomputer as a communications device to search the mul-

titude of remote databases. On ship, a crew member could use a microcomputer and a satellite link to access databases and down load the desired information. The ship's library would then include the physical items on board, and the communications link to remote informational sources.

A FINAL WORD...

Microcomputers are fantastic tools that can be used to assist us in managing our libraries and accessing information. Because of their physical size, expandability, and increasing utility, microcomputers will have an effect on many aspects of our daily lives. They are here to stay. Their potential is only as limited as our willingness to explore the ways in which we store and retrieve information now, and in the future.

COMPUTER BIBLIOGRAPHIC SEARCHING: DOWNLOADING AND UPLOADING USING A MICROCOMPUTER

Joseph G. Wible, Librarian
Lane Medical Library, Stanford University

Downloading, the electronic capture and storage of data, can be used to provide computer bibliographic search results in electronic form instead of, or in addition to, the traditional paper copy. This method of data capture is becoming more desirable as library users begin organizing their personal files using microcomputer database managers. Downloading can also be used for eliminating duplicate citations in a multidatabase search. There is a general misconception that downloading is faster, and therefore cheaper, than directly producing a paper copy of the search results, but this is not the case. Printers are available which can print at speeds of 160 cps, while accurate transmission of data over phone lines is limited to 120 cps. Therefore, given the present technology, one can print as fast as one can download. On the other hand, search costs can be reduced by uploading, the sending of pre-stored data to the host computer.

Lane Medical Library is currently using a microcomputer for searches where uploading and/or downloading is desirable. The system configuration includes an IBM-XT, a Hayes Smartmodem 1200, and PC-Talk III communications software. Uploading is used routinely when the search requires extensive typing in an expensive database. Downloading is used less frequently because of its legal ramifications. Lane has collected "Downloading Policies" from the producers and vendors of medically related databases, and, at present, downloading is done only when the patron requests his search results on floppy disk, and when there are no restrictions placed on the database by the database producer or vendor.

Lane Medical Library is located in the Stanford University Medical Center and serves the hos-

pital, the medical school, and several University graduate programs. It is also used heavily by local pharmaceutical and biotechnology corporations in addition to being open to the general public. Online bibliographic searching comprises a major portion of the reference service at Lane with over 1000 searches being performed in 1983. This number is for full searches paid for by the user; it does not include the large number of ready reference searches done at no cost to the patron.

Over a year ago, the library was first approached by a physician interested in obtaining his search results on floppy disk. The library has had a few similar requests since then, but more frequently is asked for advice by patrons who wish to perform their own searches on their personal microcomputers. In response to these requests, the library purchased a microcomputer with a modem and communications software. It also began an aggressive end-user training program. The library has also taken on the role of consultant to the Medical Center community in regard to hardware and software necessary for accessing bibliographic databases.

Traditionally, online bibliographic searching has been done on a dumb printing terminal. Microcomputers can perform all the functions of a dumb printing terminal, and they have the advantage of being able to perform functions previously not available. Two such functions are uploading and downloading. Uploading can be defined as the transmission of previously created and stored data to the host computer. Uploading can be divided into two types. One is the transmission of an entire file which had been previously stored on a floppy or hard disk. This would typically be used for sending ILL requests or electronic mail.

The second type of uploading is the transmission of text, line by line, through the use of pre-programmed function keys. This type of uploading is more useful in online bibliographic searching where more flexibility is needed. Downloading can be defined as the capture and electronic storage of data received from the host computer. Both uploading and downloading are defined based on the perspective of the user. The same data which are uploaded by one computer can be downloaded by a second computer.

DOWNLOADING

Downloading offers a number of benefits. For example, it allows one to circumvent the problem resulting from a slow printer. A 1200 baud modem receives data at approximately 120 cps (characters per second). Letter quality printers or even some of the older dot matrix printers are not able to keep up with the incoming data and some of it would be lost. By downloading, the data can be received at high speeds and then printed later at a speed the printer can handle.

Downloading also allows the output to be edited before printing a final copy. The file can be loaded into a wordprocessing package where errors due to line noise can be corrected, irrelevant data and false drops can be erased; and citations can be merged and duplicates can be eliminated in the case of a multidatabase search. Notes and comments to the patron can also be added before printing.

Finally, downloading allows for the transfer of data directly into a microcomputer database manager without having to re-key the data. This aspect of downloading offers ex-

citing possibilities for the organization of personal reprint collections or, on a grander scale, the production of a personal database.

There are two common misconceptions concerning downloading. The first is that, by using a microcomputer to download, information can be received faster than by using a printing terminal. The rate limiting step is, in fact, not the printer but the phone lines. Normal phone lines can only handle 120 cps, and printing terminals are available which can keep up with this transmission rate just as well as a microcomputer.

The second misconception is one common among beginning end-users who think information has been downloaded just by creating the set of relevant citations. The user does not realize the citations must first scroll across the screen in order to be saved to disk.

UPLOADING

One advantage of uploading is it allows the typing of messages using a wordprocessor. This is advantageous for long blocks of text such as those used for ILL requests and other forms of electronic mail. However, for online bibliographic searching where the lines of text are short and flexibility is needed, this is probably of little value. The primary advantage of uploading for online searching is the ability to preprogram function keys with lines of text; each function key becomes a search statement. This allows the searcher to send individual lines of text by pressing one or two keys. By doing this one can cut down the connect time and thus reduce online costs significantly.

LEGAL CONSIDERATIONS

At Lane, uploading is done routinely while downloading is performed rarely. The primary reason downloading is not done is due to the legal problems surrounding downloading. A good discussion of the legalities of downloading can be found in the article by Thomas S. Warrick entitled "Large databases, small computers and fast modems...an attorney looks at the legal ramifications of downloading" in Online (1984) 8(4): 58-70. In December of 1983, Lane sent out requests for downloading policies of those database producers and vendors it most frequently uses. Lane asked the producer/vendor to interpret how their policy applied to the following four scenarios:

1) A librarian receives a search request from a patron. The librarian downloads a set of citations with abstracts from your database and from the Medline database. These two sets of citations are merged, the records sorted, duplicates are eliminated, and the format is standardized. A printout is generated for the patron, and the file is eliminated from the computer's memory within an hour after the downloading took place.

2) A librarian receives a search request from a patron. The patron requests his bibliography be delivered in machine readable form rather than on hard copy. The librarian performs the search and downloads the set of citations onto a floppy disk which is then given to the patron. The library does not keep either an electronic or a printed copy of the bibliography.

3) A physician (end-user) performs a search on your database and downloads a set of citations with abstracts. He then runs a program

against the downloaded file. This program generates reprint requests for each record and then adds the bibliographic records to his personal database manager. The database manager provides author and subject access to his extensive personal reprint collection.

4) A member of a research team (end-user) performs a search on your database and downloads a set of citations with abstracts. He then runs a program against the downloaded file. This program generates reprint requests for each record and then adds the bibliographic record to the laboratory's shared database. This in-house database is searched frequently by all of the members of the research team.

The letters received in response are kept on file at Lane. For the most part, database vendors deferred to the database producers. The database producers varied widely in their downloading policies (Fig. 1). For example, records from Chemical Abstracts can be downloaded for an annual fee ranging from $50 to $8,000 while there are no extra charges to download records from Psychological Abstracts.

FIGURE 1

DOWNLOADING POLICIES

BIOSIS	$0.15 per record $0.30 per record with abstract
CHEM ABS	$50 - $8,000 annual fee
EXCERPTA MEDICA	$25 to allow temporary storage for printing
MEDLINE	permitted for personal use "multiple use subsets" available for a fee
PSYCH ABS	permitted for personal/organizational use

Database producers usually distinguish between records being downloaded for personal use versus those which will go into a database being used by a group of people.

Medline is produced by an agency of the Federal Government, and as such it can not be copyrighted. In order to avoid legal complications, Lane is at present only downloading records from the Medline database when searched through the National Library of Medicine.

PRACTICAL MATTERS

The configuration used at Lane for searching consists of an IBM-XT, a Hayes Smartmodem 1200, an Okidata 92 printer, with PC-Talk III communications software. The library owns a number of other communications software packages such as Crosstalk XVI, Smartcom II, and Kermit, but PC-Talk is used preferentially. It is very easy to use, does everything that is needed, and also happens to be the least expensive. It also does not cost anything to try since the author of the program encourages users to distribute copies to their friends. If the user likes the program, he/she is asked to send a $35 donation to the author. In return for the money, the user receives a copy of the latest version of the program and is kept informed of future enhancements. Using the Alt-K command in PC-Talk, up to forty lines of text can be preprogrammed into the function keys for uploading.

Smartcom II is another communications package commonly used on microcomputers since it comes free with the internal Hayes Smartmodem 1200. Smartcom II does not come with the external version, however. Uploading using Smartcom is done using its Macro function. It also has a feature which allows the storage of logon sequences for each computer

accessed. It takes a lot of the hassles out of logon procedures. If the feature is used, one must consider security before including passwords in the sequence. Anyone with access to the system and a little knowledge about microcomputers could find the passwords.

Scimate is a software package marketed by Institute for Scientific Information. It comes in two parts, a communications package and a database manager. The communications package is designed to act as a user friendly interface for searching on Dialog, BRS, NLM, and ISI. Unfortunately the menu system is very cumbersome, and as a result, forces the user to waste large amounts of time going through menus while connected to expensive databases. The database manager does not currently provide indexes so when it searches for a term in the database, it searches linearly through the file. As a result response time is extremely long for locating records in databases of even moderate size. Scimate is not recommended. It does not provide for cost effective searching, and there are many database managers available which will give more value for their purchase price.

Most of the big name database managers on the market are not oriented toward bibliographic or textual data. Some examples of bibliographic database managers are Citation, Personal Bibliographic System, Notebook, and BioSuperfile/BITS. The latter is endorsed by BIOSIS and, based on demonstrations, seems a reasonable product for handling bibliographic records.

Finally, there is a new software package on the market called Insearch. This package is advertised as a user friendly system for searching on Dialog. In actuality, it is not very user friendly, but does provide a very cost effective way for searching Dialog data-

bases. It allows for preformulating a search strategy before going online. Once online, search statements can be revised while the computer is working. The search results are automatically placed into a memory buffer for offline editing and printing. Since it is expensive and only useful on the Dialog system, it can only be recommended for heavy Dialog users.

SUMMARY

Microcomputers are easily adapted for use in online bibliographic searching. As an alternative to the printing terminal, they provide the searcher with the additional capabilities of uploading and downloading. These two functions allow for more cost effective searching and for the development of new and better products.

Author's Note: Since the writing of this paper, new versions of **Scimate** and **Insearch** have been released. According to advertisements, **Scimate** now allows for preformulation of search strategies and **Insearch** can now be used on both DIALOG and BRS.

IMPLEMENTING MICROCOMPUTER SOFTWARE FOR MARINE SCIENCE LIBRARIES

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In this age of computer, librarians are often called on to manage micro-computer systems, program generic software to library-specific applications or at the very least become conversant in computerese. Purchasing and implementing software for library use is one of the keys for successful micro-computer use in marine science libraries.

J.H. Katayama reminds us that "special librarians are often faced with micro-budgets, insufficient staff, and mini-collections, but with macro demands on service."[1] Maurice Freedman tells us that computer costs have decreased by 25 percent every single year since 1950 and personnel costs have increased by an even greater percentage in the same period.[2] These are the tip of the iceberg of library literature recommending computers as an answer to micro-resources and macro-demand. But selecting and implementing software seem to be major impasses in the use of computers for maximizing library services. The scenarios are familiar. After reading and researching, you have a micro-computer and software but you find the software doesn't work with the hardware or it does but you are so frustrated trying to make it work that you could scream. Or, after reading and researching, you have no clue as to how to decide which micro, which software and heaven forbid, which peripherals. The problems are related because the frustrations incurred in implementing software directly relate to the decision-making process of selecting software and hardware. Ann Wolpert jokingly writes

of hardware, software and "underware." "Underware" is her term for strategic planning - "the process of quantifying and understanding the systems that go behind the visible services - that makes for the successful implementation of a computerized library system."[3] So we must better understand ourselves and our libraries as well as software in order to implement automated systems.

What makes micros different from the minis and the mainframes are the components (microprocessors-silicon chips), size, price and memory. Always remember that micros are smaller cheaper and have less memory. Software is a generic term describing all types of computer programs - it's what makes the computer go. There are many kinds of software, both library specific and generic. Some software is a non-programmers dream, a way to get computers to do things easily; others need almost a programmer's expertise to get anything done.

Off-the-shelf packaged software ranges from simple to complicated: operating systems, specific single application packages, general application software, modular software, and programming language software. The operating system is a "software program comprising a series of functions responsible for the overall coordination and management of the hardware and software resources used by the computer system during processing."[4] The operating system is as much a compatibility factor as the hardware. Single application software is inexpensive and designed to do one simple task easily and efficiently. These are the kinds of software that librarians dream of, but they are extremely inflexible. The formats have been predetermined and the user only types in information as directed by prompts. Game software, catalog card programs, recipe to grocery list converters, communication software, and mailing label compilers are exam-

ples. General application packages are large programs that do many simple everyday tasks. They are more expensive, because they are more complex; but, because of the universality of the tasks, they are very useful. Word processing programs and spreadsheet programs fit in this category. Modular software is usually a large expensive software package that can do many things and can often work with other software. Examples are database managers, integrated library software and integrated software like LOTUS 1,2,3. Finally, programming language software is often called a compiler and intermediates between the professional BASIC, COBOL, FORTRAN and PASCAL programmer and your computer. You, the novice, can use most of these kinds of software for everyday activities, such as balancing the budget; and you can manipulate some to do library specific tasks like creating bibliographies. You can also hire experienced programmers to use all of the above software to create whole systems of customized and very expensive software.

Library-specific software is a different issue entirely. It is available for many library functions and will be available for almost any library function, in time. Robert A. Walton divides software for libraries into successful, emerging and struggling application. The software that have proven successful and efficient are: word processing, accounting, numeric spreadsheets, card catalog production, database searching, computer aided instruction and mailing lists. Emerging applications are those that are being tested and are not 100% debugged. Into this category Walton places serials control, circulation control, acquisitions control and community information systems. Obviously librarians will be delighted when these are perfected. Struggling applications are the ones

we want the most: on-line public access catalog and cataloging.[5] But completely integrated systems are still in the future. Some features are part of most systems, some will be available within a year, some may be available someday. Because they are all created by different vendors for different equipment and using different programming languages, they will not all fit into an integrated system. This forces the librarian to choose one function over another. Explore the fact that non-library software may do the same task more easily and more efficiently. Choose library specific software very cautiously in this time of rapid change in software.

I find an inverse (or perverse) ratio with software. The simpler and less expensive the software, the easier it is to use, but it can only be used for one task. The more expensive, more flexible software, inversely, is more difficult and time-consuming to implement. Software seems to be proliferating faster than rabbits, so if a specific package is not available or compatible, wait a few days or weeks and it may soon be on the market.

The rule of thumb is to choose the software first to support specific library functions and then choose the hardware and peripherals to support the software. But before you make a decision, you must make some concrete plans and some hard decisions. Before purchasing software, you must first assess the library's needs, abilities and budget. Involve the staff in a thorough investigation of library functions and choose the ones most suited to computer strengths. Remember that micros are best used to streamline and speed internal procedures, especially repetitive tasks, in order to better serve the user. Be sure to prioritize these functions from necessary to optional. Assess the library-computer ambience as well.

Is there a comfortable private place to work with the computer where the printer noise will not disturb patrons or staff? Are there staff members with time, interest and some expertise, or do they all hate machines? A staff and needs assessment may clear up problems in the manual system that may eliminate the need for automation. And it may point out attitudinal problems, either antagonism or superenthusiasm, that can be dealt with before the computers arrive, thus easing the implementation process.

Try to be realistic in your assessment of staff and attitudes, your own included. If you or your staff have little or no computer expertise, but there is no lack of enthusiasm, begin with something small and easy. The satisfaction payoff is great with both a word processor and a spreadsheet system or a file system. This is also a good approach to win favor with apprehensive staff or upper management. If you need an acquisitions system to track monies and purchases, try a spreadsheet system instead of a database manager. If you plan to type several manuscripts with tables and bibliographies, type a few letters first. If all you need to do is help the cataloging typist create cards quickly, get a catalog card program for $200, not an online catalog unit for $500. In other words, don't tackle ambitious projects or critical library functions until you know what you are doing. Make sure the application is somewhat efficient on paper before you replace it with a computer. A micro can create order out of semi-chaos, but it cannot correct a totally chaotic system. In exactly the opposite vein, don't replace minis or mainframes with micros unless you are certain that the application warrants such a small system. Don't replace a simple, quick, well-functioning manual system with a micro.

Most library applications, however unique, can be implemented with off-the-shelf software. Customized software should be created only if the application is very complex and very unique. Generally, the most cost effective and useful software for our small marine science libraries is a word processing package, perhaps a spreadsheet package, a database manager and a communications package with a modem. You may want one bit of library specific software for a specific problem, like card catalog production or circulation. The database manager will be the most useful, because it is designed to manipulate files in many ways. Not only will it help with indexing our usual reprint and map colllections, but with a word processor, it will also create overdue notices, catalog cards and order letters, and it may replace the spreadsheet package for budget applications.

Library literature abounds with articles about reviewing and researching computer literature, and interviewing vendors, col'eagues and local users in an effort to choose appropriate software and hardware and I doubt seriously that I can add anything to this discussion. Firm written plans for your library needs; a realistic understanding of what you, your staff, and microcomputers can do; and a large amount of research and discussion of software and hardware will get you a good workable microsystem.

In any case, many of you have your own hardware and software already. You don't want to know that you've chosen the wrong system, you want to know how to make your system work. You, like me, perhaps, thought that choosing the system would be the hard part and plugging it in and getting it running would be simple. How wrong we were! I thought I could read the manual and get the computer to do things. Wrong! I thought I

could muck around and muddle through. Wrong, wrong, wrong! Now you need to invoke the keys to implementation: a plan, dedicated time, interest and colleagues.

Whether you do the implementation, or a staff member does it, and whether implementation includes learning to work a word processor or using BASIC to program a complicated library project or directing the input for a major database, establish policies and procedures. Decide who is to use the equipment and for what purpose. Where will the equipment be located and how will computer time be allotted? What tasks have highest priority? Will certain applications be implemented concurrently, or will one be implemented first? A multi-user system should have a manager for the mundane tasks of updates, paper acquisition, repairs and standards.

Try to get software manuals before the hardware arrives and read them thoroughly. If the manual is unintelligible, scour the markets and find trade books on your specific software and read them thoroughly. Sometimes software problems appear after the manufacturer's documentation has been published. Other problems are the result of misleading or incorrect documentation. These supplemental manuals explain these problems and also may explain special approaches to that specific software. Some software includes tutorials. These take time but are great learning aids. Some software comes with a learner's manual, a step-by-step guide to implementation. These, too, are great implementation aids and well worth the time.

Only after a fair amount of reading and understanding should you begin experimenting. Learn the system, practice, learn the most used commands, have fun with it! This is a means of building up confidence in yourself and the software. There will be problems and

frustrations, but when they are part of a play situation, solutions come easier. Don't try to implement a system alone. Join a user's group. Line up telephone numbers of colleagues, professors, vendors. Keep these close at hand and call the appropriate source at the least provocation. Ask everything from how to approach a programming problem to why one feature isn't working. It also helps to talk to colleagues working with the same software on similar machines. It is especially pleasant to work with another library staff member on similar problems. Beware the expert who can fix the problem more easily than he can explain what is wrong. The problem will be alleviated, but if it ever comes up again, you still won't know how to correct the problem. When you feel confident, begin to tackle the first priority library application. You will need to experiment with this as well. There will be many changes before the system is debugged, tested and corrected. Allow yourself or staff more time than you've anticipated - which is another way of saying that it will take much longer than you could possibly have imagined. Everything can be up and running sooner, if large blocks of time are allotted to the project, not an hour here or there. But limit time working with the micro to four hours, because after that point, working with the CRT will create eye strain and fatigue. Use utility programs like ProKey and Quickcode to facilitate programming modular and other software. They shortcut some operations and extend others and generally make for easier implementation. The interest factor is hard to define. You really have to want to implement a system to conquer the frustrations involved.

There are management tips that ease implementation. When choosing software, opt, if possible, for the kind that can be duplicated.

Originals should be kept separately in case of emergencies. Back-up copies are not essential, they are imperative. Every user should be responsible for their own disks. It should be drilled into every user's mind to make back-up copies of often used software, important data files and important programs after each session of input and to store the back-ups in a separate physical location. Copying disks works at the simplest level of computer operations and should be the first thing the user learns after learning to turn the machine on. With multi-user systems, it is good for each user to copy an update, so that the most recent update is always saved.

Label everything: disks, location of documentation, printer settings, parities, etc. Use notes in all your own programming and create documentation for your own systems, even if you are the only one who uses the system. Use menus and prompts often in systems designed for other users. Robert Walton says that "lack of reliable documentation will result in frustrated staff and patrons who will view the microcomputer as overly complicated, the staff as incompetent and the project as unsuccessful."[6] Documentation is usually the last step of implementation and is often overlooked, but a fully documented, user-friendly system is much easier to use and to teach someone else.

There are two major enemies to the physical wellbeing of microcomputers and disks: electrical problems and dust. Beware of rainstorms, lightning, power surges and outages, and static electricity. All can damage hardware and disk memory. Surge arresters will help eliminate problems with power surges, if they are common in your area. Most computers require little in environmental ambience, but most do better with a dedicated power source. Don't load

up equipment on a single outlet. Use anti-static mats in offices with static-prone carpets. Store disks away from extremes of temperature, humidity and strong magnetic fields. Keep disks dust and smoke free. Discourage smoking and eating at the keyboard. Advice differs on cleaning dust from micro read-write heads. Some expect the user to do the cleaning, some require the cleaning by professionals. Check with your dealer about this.

Staff training is important and should not begin after all the programming, but at the beginning of the decision making process. Staff input throughout the planning and implementation will aid the implementers and end users. Change is difficult for many library workers, but if they are involved in creating and facilitating change, a sense of excitement and challenge will grow. Our small libraries are ideally adapted to implementation by several staff members, but larger libraries will have proportionately larger personnel problems.

Finally, give yourself and your staff a chance. The decision to automate a function may not have been as successful as hoped for, but then another function may improve with automation. Susan Epstein warns that "automation is not the right option for every library. Each library must decide whether or not any form of automation is the wisest use of its resources. It is not necessary to automate just because everyone else appears to be doing so. Library automation is changing rapidly. Decisions made today may, and probably will, be different tomorrow. The important point is that a library must continually reassess its position on automation and keep an open mind."[7] You must always remember the micro's limited storage capacity and slow response time with large databases. It is designed to be a small system for local application,

so it isn't really necessary to have it work well with other systems; it needs only to do the job allotted in your library. "When you decide to automate, know that a complete set of problems and costs come with this new technology,"[8] advises Maurice Freedman. And have no fear, change will be with us for a long time. As soon as you conquer DBase II, you will see the announcement for DBase III! But once the library staff and users find a taste of satisfaction in the change, they will demand more and more and the demand must be met. With an easy, efficient application, micros can save enough time to almost be considered another employee. But the time it takes to implement that application may take a staff member weeks or months to perfect. Knowing as much as possible about software and developing realistic expectations about what it can and cannot do can ease the implementation process from the very beginning. In fact, time, patience, knowledge and interest are the only weapons in the fight to tame software. For like the fox and the Little Prince, software and the user must tame each other. "'One only understands the things that one tames,' said the fox. 'Men have no more time to understand anything... If you want a friend, tame me...'"[9]

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SPENCER FULLERTON BAIRD AND THE FOUNDATIONS OF AMERICAN MARINE SCIENCE

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In 1863, 121 years ago, Spencer Fullerton Baird blazed a path that would be followed by thousands of future biologists when he came to Woods Hole, Massachusetts, to undertake summer research. Until his death in 1887, Baird returned again and again to this delightful New England village. In the process, he established institutional foundations which deeply influenced the future of American marine science.

Spencer Baird was one of America's preeminent systematic zoologists in the mid-19th century. His bibliography included hundreds of contributions on reptiles, amphibians, fishes, and especially on mammals and birds. In a period prior to the establishment of the nation's great graduate schools or most of the other learned institutions that lent support to American scientists, Baird was fortunate to have an appointment as assistant secretary of the Smithsonian, which then was directed by the physicist Joseph Henry. At that institution, Baird was especially active in developing the National Museum largely through his skill in obtaining generous Congressional appropriations. That museum would reach its full fruition after 1878 when Baird succeeded Henry as the Smithsonian's secretary.

In addition to this major effort, Baird became increasingly interested in marine biology during the decade of the 1860s as he combined vacations at various points along the eastern seashore with the collection and study of oceanic organisms. By 1870, when he returned

to Woods Hole for a second summer, Baird was well aware that European biologists were turning to the mysteries of the oceans with increasing fascination. At that time, Anton Dohrn was laying the foundations for his famed research station at Naples and within two years HMS Challenger would embark C. Wyville Thomson and his scientific team to undertake an historic oceanographic cruise throughout the world's major oceans. In a more general sense, biological activity in the marine environment was promoted by Darwin's Origin of Species, which had been published in 1859. For evolutionists, the study of the oceans had special significance since the sea was believed to be the ancestral home of all life. Further, the flora and fauna of the oceans were remarkablely diverse, abundant, and relatively simple in comparison to terrestial forms. For all of these reasons, marine biology had special appeal to Baird, as it did to many other naturalists of his time.[1]

It was typical of the Smithsonian's assistant secretary that he could depend upon the assistance of the federal government in undertaking his scientific enterprises. During the summer of 1870, probably because of the intercession of Baird's close friend, Senator George Edmunds of Vermont, who was vacationing at Woods Hole, a U.S. Revenue Service craft was loaned to Baird to assist in collecting marine specimens, including a number of species not previously reported as part of the fauna of Massachusetts. During that summer, Baird also became aware of a long-standing dispute in the Vineyard Sound and Buzzards Bay area, and for that matter along much of the rest of the northeast coast, that seemed to invite solution by cool scientific reason. Baird seized upon that controversy to establish a federal

agency that would be dedicated to the solution of practical problems, but also promised to support fundamental research in American waters.

The issue that was reaching a crisis in the summer of 1870 involved a classic conflict between competing groups seeking to use the nation's natural resources. On one side of the dispute were relatively well-capitalized groups of men who erected fixed coastal nets and barriers, known as traps or pounds and a variety of other names, that made enormous catches of fish. On the other side were small scale fishermen who typically fished by line from small boats, often for their personal subsistence, and the growing number of sport fishermen who came to the seashore for recreation. The latter groups were increasingly alarmed by the decline of such coastal species as the scup, sea bass, tautog, and striped bass, and soon concluded that their problem stemmed from the massive catches taken by fixed nets and barriers. The solution, in the opinion of the boat and sport fishermen, was simple. Fish traps and pounds should simply be outlawed by state law.

As the politicians in southern New England contended with these demands and the vigorous counter arguments of the owners of traps and pounds, Spencer Baird volunteered to undertake a scientific study of the coastal fisheries provided that Congress would appropriate the necessary funds. Baird's skill as a lobbyist and the influence of his many friends in Congress led in 1871 to an act authorizing the United States Commission of Fish and Fisheries. That body was charged with determining whether American fish stocks had, in fact, declined. If such a decline were established, the commission was to determine its cause and to propose corrective measures. An initial

appropriation of $5,000 was allocated for these purposes and Spencer Baird agreed to serve as the director of the new agency for no additional salary beyond that received in his capacity as a Smithsonian official.

In 1871, Baird returned to Woods Hole, accompanied by a small group of scientific volunteers, and established his headquarters at a Light House Service building in Little Harbor. Taking advantage of provisions in the enabling legislation which encouraged other governmental agencies to render assistance, he obtained the services of three small Revenue Service and U.S. Naval craft to take scientific collections off the southern coasts of Massachusetts and Rhode Island. The approach defined by the new commissioner was broad in nature, involving not only an examination of the quantity and location of marine species, but also the availability of their food supplies, the possible impact of parasites or diseases, and the influence of weather, water temperature, salinity, and currents upon fish population.

Baird's study confirmed that there had been a decline in the numbers of fish off southern New England. He also concluded, much too hastily as it turned out, that man's intervention through the use of traps and pounds, especially by interfering with the spring spawning process, was one important factor in this decline. His recommended solution, however, was that these devices should be prohibited during only a portion of the spawning season rather than abolished outright.

Despite the crafty compromise developed by Baird between the outright elimination and unhindered use of traps and pounds, the state legislatures in Rhode Island and Massachusetts were not inclined to enact the regulations that he suggested. To add to Baird's distress, it also became evident in the following year

that an enormous new year group of the scup was present in the waters of New England, despite the failure to control the catches taken by fixed nets and barriers. It is not surprising that, after 1872, Baird was convinced that an understanding of the dynamics of oceanic populations was a much more complex matter than he had imagined when he began his work as the U.S. Fish Commissioner.

Insofar as Baird's scientific interests were concerned, the results of the Fish Commission's early operations were more promising. From his station in Woods Hole, Baird and his scientific associates received the enormous collections of marine life taken in the area and used these materials as the basis for a number of papers and monographs. Among these were life histories of the scup and a new catalog of coastal fishes prepared by Theodore Gill. William G. Farlow, who expressed thanks to Baird for "opportunities for collecting ...such as no American algologist has ever before enjoyed,"[2] assessed sea weeds in the area. An even larger series of invertebrate forms fell under the observant eyes of Addison E. Verrill of Yale. Verrill's 500-page monograph, "Report Upon Invertebrate Animals of Vineyard Sound and Adjacent Waters With an Account of the Physical Characters of the Region," was published in the Fish Commission's first annual report in 1873 and represents an important landmark in the history of American marine biology. There was, of course, a practical rationale for this study, due to the importance of these forms as a food source for commercial fishes. Nevertheless, Verrill's research also demonstrated that Baird's vision of using the Fish Commission as a foundation for broad investigations in the marine sciences was being fulfilled.

Despite the disappointing practical results of the Fish Commission's first year of operation, Congress showed no inclination to halt annual appropriations for this new agency. Under these circumstances, there was a prospect that many additional contributions, perhaps similar in importance to Verrill's study, would continue to appear. These conditions are reminiscent of A. Hunter Duprees's assessment of the characteristics of much government science in the 19th century. Certainly, Dupree's observations that "practical problems tended to reach out in ever-widening circles of theoretical considerations," and "ad hoc organizations tended to become permanent" apply remarkably well to the Fish Commission.[3]

One reason for the permanence of the Fish Commission - it counts as one of its direct successors the National Marine Fisheries Service, which is a host for today's conference - was Baird's willingness to undertake a highly utilitarian program involving the hatching and redistribution of desirable species to replenish America's increasingly barren waters. To some extent, this new emphasis upon multiplying resources superseded Baird's interest in conserving these populations through regulation, a very difficult task due to the large number of states involved and the uncertainty of federal authority in coastal and interstate waters. Baird did continue to recommend that states enact laws to protect the spawning process, restrict the taking of undersized fish, halt pollution, and to build fishways on major rivers that would allow anadromous fish to reach their spawning grounds. But, despite the enactment of a number of measures along that line, basic inconsistencies between state regulations and a continuing problem of enforcement plagued Baird's regulatory efforts to the end

of his life.

The seemingly more feasible solution of supplementing natural populations of fish with a hatchery program was being pursued by several eastern states in the 1870s, especially as a result of political pressure from the sport fishing community. These efforts, however, needed to be augmented by the federal government and it was not long before contact was made with Spencer Baird. Largely as a result of his typically quiet but effective efforts on Capitol Hill, Congress appropriated the sum of $15,000 in 1872 and directed the Fish Commission to introduce desirable species into the waters of the United States. The appropriation act specifically mentioned the propagation of salmon and whitefish and, remarkably enough, required that an effort be made to establish the Atlantic shad in the Gulf Coast and Mississippi Valley regions.

Working in close cooperation with state commissions, Baird undertook this new program with considerable enthusiasm. In fact, fish culture soon became the single most important activity of his organization. By Baird's death in 1887, annual appropriations for artificial propagation had grown to $200,000 per year, out of the agency's total budget of $268,000. The great majority of Baird's 105 employees in 1887 were engaged in fish culture at various locations in the United States. Also available to the commission was a ship built in the late 1870s, the Fish Hawk, that was specially designed as a floating hatchery.

This program was exceedingly popular, especially since Baird assured that young fish or impregnated ova were distributed to the entire nation, preferably through individual applications to the local congressman. In this way, he assured political support for an activity that was widely perceived as a

humanitarian effort to improve the nation's food supply. A classic example was Baird's effort to introduce the German carp for pond culture on the nation's farms. The carp thrived in American waters and initially were received with enthusiasm. But, at the time of Baird's death it was evident that Americans did not share the European culinary taste for this species. Further, the carp, having escaped from their ponds, were considered by most observers to be a trash species that crowded out more desirable fish, a problem that persists to the present day.

Baird also sought to replenish other inland fisheries in conjunction with state agencies. For example, the rainbow trout, originally found on the west coast, was established in other areas of the United States. Additionally, the Fish Commission pioneered the introduction of the German brown trout into this country. There also was a continuing but unsuccessful effort to halt the decline of the Great Lakes whitefish through hatchery operations.

So far as anadromous species were concerned, the Fish Commission concentrated much attention on hatching Pacific and Atlantic salmon. In addition to supplementing the runs in their local regions, Baird undertook the transplantation of Pacific species to the East Coast. But, despite initial signs of success, these efforts were outright failures or at best yielded dubious results in maintaining salmon populations.

In accordance with Congressional directions, Baird worked with the Atlantic shad. Again, however, the results were uneven. Baird may have helped to maintain their runs on some rivers along the east coast, but the effort to establish the shad in the Gulf Coast and Mississippi Valley regions was an outright

failure. On the other hand, shad were introduced successfully on the West Coast. In a related program, the striped bass also were transplanted to Pacific waters.

Baird was not naive enough to believe that artificial propagation could have a general effect on oceanic species. But, in the 1870s he held forth the hope of using hatcheries to establish local schools of cod and other species in the coastal waters of New England. Starting in 1878, the commissioner established such a facility at Gloucester, Massachusetts, which was given credit for improved fishing in that area. Building upon that experience, the commissioner then obtained a series of federal appropriations between 1882 and 1885 to erect a hatchery, originally for the cod, at Woods Hole. As Baird noted in his approaches to Congress, Woods Hole was an ideal location due to its relatively mild winters, and pure, saline, and clear waters. The closeness of the village to New England's major fishing grounds was an added advantage. By 1885, two imposing buildings were completed, one of which housed fish culture apparatus and scientific laboratory facilities. The other was a residence for the Fish Commission's staff. At the time of Baird's death in 1887, major cod hatching operations had been underway at Woods Hole for only a short time. Nevertheless, there were reports that for the first time in many years, cod were being taken close inshore at Woods Hole, a happy circumstance that appeared to have resulted from the Commission's artificial propagation activity. In the longer run, however, it became evident that the effort to replenish coastal cod stocks was a failure.[4]

Another major utilitarian program of the Fish Commission grew out of a diplomatic settle-

ment in 1877 by which the United States paid Canada the sum of 5.5 million dollars for use of the dominion's inshore fisheries. Baird had been the chief American scientific witness at the arbitration in Halifax, Nova Scotia, which granted this award, but he was convinced that it was an exorbitant judgement that overvalued the Canadian fisheries. In his opinion, it also failed to take into account the countervailing value of American waters which were available to the Canadians on a reciprocal basis. This conclusion and the prospect of further diplomatic negotiations after the Halifax settlement expired in the mid-1880s, led to Baird's interest in compiling detailed statistics and other information on the fisheries of the North Atlantic. In light of the Canadian-American controversy over fishing rights, which was hardly unique to the late 19th century, Baird also resolved to offer aid to American commercial fishermen that to some extent would offset the generous subsidies offered to the Canadian industry by its government. He also shared the hope of many American politicians and diplomats to make the United States independent of the Canadian inshore fisheries.

One of Baird's initial achievements was to plan a comprehensive survey, prepared under the direction of his Smithsonian colleague, George Brown Goode, and entitled The Fisheries and Fishery Industries of the United States. Baird arranged for this work to be sponsored by the U.S. Census Bureau and some of Goode's findings appeared in the Tenth Census of the United States. The total data collected, however, included insights into the social history of American fishermen, information on virtually every major fishing port in the United States, scientific descriptions of hundreds of species of fish, and practical details on fishing methods and grounds. Since this material was too exten-

sive for inclusion in the census, Baird obtained a special Congressional appropriation in 1882 to print Goode's study as a separate seven-volume publication.

Also of significance to the history of American marine science was Baird's search for new fishing areas, preferably in waters as far removed from Canada as possible. In 1879, a commercial schooner out of Gloucester discovered off the coast of Massachusetts large quantities of a species, the tilefish, that seemed to have all of the merits of cod. Although it later was learned that this fish fluctuated widely in its abundance and hence was not a viable commercial catch, Baird used the tilefish as a prime example of the benefits of a systematic exploratory program. On this basis, he was successful in 1881-1882 in obtaining from Congress appropriations of $190,000 for a famous ship, the Albatross, that may have been the first specially designed oceanic research vessel built anywhere in the world. This 234-foot steamer was delivered to the Fish Commission in 1883 and continued to make notable contributions to the oceanographic sciences over the next 38 years.[5]

As promised by Baird, Albatross did undertake surveys with direct relevance to America's fishing industry. These included studies of the migrations of mackerel and menhaden and a pioneering investigation of the Gulf of Mexico, including the red snapper and shrimp fisheries. At the time of Baird's death, the ship also was preparing for a voyage to the Pacific Northwest, which, as was true for the Gulf of Mexico, then was an area little used by American fishermen. But, as will be noted, Albatross's contributions to economic ichthyology were limited by Baird's obvious preference to use the vessel for scientific surveys of the North Atlantic. One observer noted in

1891, for example, that the great majority of the ship's stations had been on the outer edge of the continental shelf "outside the ordinary range of fishing grounds."[6]

The Fish Commission also sought, after the Halifax arbitration of 1877, to improve the equipment used by American fishermen. For example, Baird demonstrated the value of gill nets, which had been developed in Europe, and laid the basis for a modest winter cod fishery off the New England coast. These nets were of particular interest since, through their use, it was possible to avoid the expense and difficulty of purchasing bait, much of which came from Canadian waters. The Fish Commission also introduced the beam trawl, another European device. This net proved its effectiveness, but it was little used by the American commercial fishing industry until after the turn of the century. Finally, Baird's agency promoted a new type of schooner to replace the speedy but dangerously unstable vessels used in the offshore fisheries. Baird's staff specifically designed a vessel named Grampus featuring a deeper hull and improved sail plan. Grampus was one of several prototypes that influenced the development of improved schooners after the mid-1880s.

Spencer Baird had no hesitation in applying science to the practical ends specified in the expanding appropriations received by the Fish Commission between 1871 and 1887. But, Baird's close associates knew that his most fundamental interest was in using that agency as an engine for basic research in the marine sciences. In fact, taking what one friend termed a "liberal and philosophical interpretation of the law,"[7] and recognizing that practical ends would be served by a "series of thorough inquiries into the general physical and natural his-

tory of the seas,"[8] Baird proceeded to undertake the first sustained scientific study of American waters.

This aspect of the Fish Commission's program primarily was associated with its summer laboratories. Between 1872 and 1880, those stations were established at various points along the northeastern coast, ranging from Noank, Connecticut, to Halifax, Nova Scotia. Woods Hole, however, continued to hold a special attraction for Baird. He returned there in the summer of 1875 and then, in 1881, announced that henceforth Woods Hole would be his permanent base of operations. It was at that time that the Fish Commissioner began his campaign to obtain Congressional appropriations for facilities to hatch oceanic species at Woods Hole. That fine, deep-water port also would serve as a base for the commission's vessels.

Both at Woods Hole and at the other locations used by Baird prior to 1881, simple laboratories were established for the commission's use. Into these facilities came large collections of marine specimens originally collected by vessels of the Navy, Coastal Survey, and Revenue Service that were on loan to the agency. After the late 1870s, the Fish Commission's own ships, including Fish Hawk and Albatross, also were used for this purpose. To study these collections, Baird continued to invite volunteer scientists to join him for the summer. In the decade of the 1880s, the visiting investigators averaged about fifteen in number. Aside from offering rich research materials for these biologists, Baird extended other inducements, including the opportunity to retain duplicate specimens and the prospect of publishing scientific papers in the annual reports and bulletins that were printed for the Fish Commission at government expense. A few of these scientists, who

were considered temporary government employees, received small salaries for their summer work.

The central figure in Baird's scientific corps was Addison E. Verrill of Yale University, a well-known specialist in marine invertebrates. The Fish Commission also secured the services of a number of Verrill's students, including such men as Edmund B. Wilson and C. Hart Merriam who were destined for scientific fame. Another dominant figure was George Brown Goode, who directed the Wesleyan College museum until 1877 when he joined Baird at the Smithsonian. Goode was the specialist in charge of the fishes collected by the commission.

In the 1870s, the primary focus of Baird's scientific effort was on the continental shelf. Here enormous collections were taken by the Fish Commission, including hundreds of species that were new to science. The systematic zoologists associated with the Fish Comnmission categorized and described these specimens in numerous scientific papers. Such investigators as A.S. Packard of the Peabody Academy of Sciences also prepared papers on the distribution of marine life, including its relationship to physical oceanography, that were important contributions to the ecological literature on New England's waters. Other notable contributions included writings on marine botany by William G. Farlow of Harvard and a large number of papers by John Ryder, who was the commission's full-time embryologist between 1880 and 1886.

In the late 1870s, however, the Fish Commission's attention increasingly turned to the deep waters of the continental slope and the oceanic basin, which at that time were areas little known to marine scientists. Some sense of the excitement felt by the commission's investigators was conveyed by George Brown Goode's

reaction to the organisms taken from 160 fathoms in the summer of 1877 at a station 44 miles off Cape Ann, Massachusetts. Goode noted:

> "It seems incredible that American naturalists should not then have known that a few miles away there was a fauna as unlike that of our coast as could be found in the Indian Ocean or the seas of China." [9]

Three years later, Baird diverted his newly completed hatchery vessel, Fish Hawk, from her normal duties and directed her to another station on the Gulf Stream slope. Fish Hawk, in the Commissioner's words, returned with examples of a "most wonderful fauna, vastly exceeding in richness and extent anything known to science." [10] It probably is no coincidence that after 1880 Baird began his campaign to obtain funding for Albatross. Although this steamer was justified to Congress for use in developing commercial fishing grounds, Albatross was specially designed and equipped for deep-sea scientific research. Her first dredging station, occupied in 1883, was in waters with a depth of 1,400 fathoms, a most unpromising area for species of commercial importance.

The task of studying the rich collections of deep-water specimens taken in the 1880s was divided between Addison E. Verrill and his students, who handled the invertebrates, and George Brown Goode, who worked with the fishes. Eventually, Verrill wrote almost 100 papers based on the Fish Commission's collections. Goode collaborated with Tarleton H. Bean, who had access to the more modest collections of deep-sea fishes obtained by Alexander Agassiz during his private cruises in the steamer Blake. In 1896, Goode and Bean published their results in Oceanic Ichthyology. With a degree of chauvinism the authors noted that the forty-nine new genera and the 147 species

of deep-sea fishes covered in their monograph represented a greater number than had been obtained by Challenger in her famous oceanographic cruise.

Aside from these fundamental contributions to marine biology, Baird also developed in the 1880s an ambitious plan to use his base at Woods Hole as the nucleus for a much broader program of research and education. In constructing this facility, Baird obtained advice from Anton Dohrn whose marine station at Naples was already famous in the world of science. One of Dohrn's practices that was followed at Woods Hole was to sell research tables to other institutions, which in the case of Baird's laboratory included four universities and colleges: Johns Hopkins, Harvard, Princeton, and Williams. In addition, the Fish Commissioner controlled, through wealthy friends, a quantity of land that was adjacent to his own building. Baird's benefactors were willing to donate or lease these lots to other scientific institutions that might be willing to join the Fish Commissioner at Woods Hole.

Baird's overall plan was spelled out in 1882 in a personal letter to Daniel C. Gilman, the President of Johns Hopkins University.[11] The Fish Commissioner proposed to make available excess land in the vicinity of his buildings to universities or colleges desiring to erect special laboratories or summer schools of natural history for their students. As a further inducement, he suggested that the occupants of the tables in the Fish Commission's laboratory would offer a series of lectures to combined classes of these students. Additionally, Baird offered to construct a common mess. Presumably, the rich scientific collections brought in by the commission's vessels also would be available for this informal university of marine biology.

The Fish Commissioner's vision was not fulfilled during his lifetime. To a large extent, this was due to an embarrassing dispute that began in 1885 when an official of the new Administration of Grover Cleveland charged that the Fish Commission's rather elaborate facilities at Woods Hole, which included a residence building and scientific laboratories, far exceeded the intent of Congress in making funds available for a marine fish hatchery. Baird's friends in Congress soon forced this investigation to be dropped, but in the two years remaining in his life, Baird was very cautious about undertaking any activity that might be questioned. That certainly included the establishment at Woods Hole of a summer university under the inspiration and guidance of a government agency.

Nevertheless, it also needs to be noted that a significant part of Baird's dream would be realized in 1888-1889 when his long-time friend and summer laboratory associate, Alpheus Hyatt, took a leading role in establishing the Marine Biological Laboratory. Although that institution was entirely separate from the Fish Commission, Hyatt suggested that the MBL was a direct outgrowth of Baird's educational scheme.[12] Of course, in the longer run, the MBL was joined by other scientific institutions, including the Woods Hole Oceanographic Institution. One can only conclude that, if Spencer Baird were alive today, he would be pleased, but not entirely surprised, by the distinguished research and educational enterprises that are located in this area.

In looking back at Baird's stewardship of the Fish Commission through the first sixteen years of its existence, one must be impressed by the continuities between the late 19th century and our own time. After all, the issues that

his agency addressed are familiar ones, including the dynamics of marine populations, efforts to maintain and enhance the productivity of commercial fisheries, direct aid to the fishing industry through improved techniques and exploratory fishing, and finally a vigorous program of basic research. But, in the largest context, Baird perhaps can best be remembered as one of the able institution builders of a century ago who recognized the essential need for universities, museums, and government agencies to support and encourage an American scientific community that was then in its infancy. The foundations laid by such men as Spencer Fullerton Baird were the essential pre-condition for the thriving marine scientific community that is so visible in the Woods Hole of 1984.

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SEAFDEC'S FISHERIES INFORMATION ACTIVITIES

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The three technical Departments of SEAFDEC and the Secretariat are actively conducting fisheries information programs, inter alia by arranging for the exchange and dissemination of post-harvest technology and aquaculture. In 1984 the implementation of information projects has been given further impetus by the assistance of the International Development Research Centre (IRDC) of Canada, so that the Departments and the Secretariat collectively have been able to develop improved information services in support of the continuing development of fisheries in the region. The comprehensive activities being pursued now make it possible for SEAFDEC as a whole to serve various types of users requesting different types of fisheries information.

PRESENT FACILITIES AND SERVICES

Training Department

The main function of the Training Department library is to serve the training and research staff of the Department. Established in 1973, it has been steadily expanding over the years through donations and exchange of literature and publications with overseas institutions and laboratories.

The library acquires technical publications, serials, reprints, annual reports, conference proceedings, bibliographies, abstracts and indexes of journals, statistical reports and maps, as well as directories and other reference material on general subjects.

The library provides reprographic services, and also advisory and general information services. To ensure effective information dissemination, lists of new publications and reprints

are circulated to the professional staff of the Department.

The library is also developing audio-visual aids such as slides, filmstrips, and video programs to be used in lectures and demonstrations. Under consideration is the possibility of computerizing the literature titles according to the author's name and subject sequence to increase users' ease in obtaining the materials required.

Another activity of the Training Department in the field of information dissemination is the publication of technical papers in the Text and Reference Series and the Miscellaneous Papers Series, as well as Cruise Reports. To date, approximately 150 publications have been issued in these series which are cited in the List of SEAFDEC Publications, 1968-1984.

Marine Fisheries Research Department

The library of the Marine Fisheries Research Department (MFRD), which was established in 1969, provides all the standard library services similar to those of the Training Department's library. The MFRD library has been providing referral services on fisheries post-harvest technology as well as marine fisheries in general since it is the only library in Singapore specializing in this subject.

Measures have been taken to upgrade the library services. Since 1983, the library has extended its Current Awareness Service to other related organizations and libraries in Singapore. The MFRD Library Accessions List has been circulated to ten key libraries in Singapore, together with selected content pages of specific interest to the users. The response to this service has been so encouraging that the library plans to extend the service to other Member Countries and technical departments of SEAFDEC.

A project to provide easy and fast sorting and retrieval of reprint titles using a microcomputer was completed in August 1983. Thus the MFRD's computerized library reprint system enables users to locate articles based on the author's name, subject/keywords, journal or year of publication. Technical serials are continuing to be in-put into the system.

In Singapore, there is close cooperation among libraries involved in fishery information science. Thus there are existing avenues of access to national imprints.

The library also plans to co-operate with the National Library of Singapore in its project to compile a union catalogue of monographs and serials. This will not only increase efficiency when dealing with enquiries, but will also assist the librarians in making inter-library loans, and cataloguing books.

Aquaculture Department

The SEAFDEC Aquaculture Department (AQD) library serves as a center for scientific literature on aquaculture in the Philippines and in Southeast Asia in general. Information on tropical aquaculture is the main type of information acquired and disseminated by the Department. Culturable tropical animal and plant species, in particular milkfish, prawn, catfish, tilapia, carp and algae, form part of the Department's information bank. Relevant information on fish biology, diseases and pests, feeds and nutrition, aquaculture engineering, socio-economics of aquaculture, etc., is collected, processed and disseminated. Relevant materials on algology, chemistry, in particular bio-chemistry, etc., are also included.

Acquisition is enhanced by an active exchange program. The Aquaculture Department library collection now contains several thousand volumes of monographs, pamphlets and reprints in ad-

dition to its own publications, microfiche titles and microfilms.

The library staff produces a monthly Acquisitions List of catalogued materials, which is included in the annual catalogue of the library. Aquaculture Abstracts of materials found in the library is published quarterly. A Milkfish Bibliography of materials found in the library was published in 1983. A list of Serials Holdings of the library will be issued shortly.

All these publications are destined for the Department's research staff and interested libraries/information centers, and development technologists in the Philippines and abroad.

The Aquaculture Scientific Literature Service (ASLS) is an outreach project for remote research institutions and development workers. An informal Selective Dissemination of Information (SDI) project is also addressed to the research staff at the Tigbauan, Leganes, Binangonan and other stations of the Department. Approximately 5000 pages of photocopies are sent out each month through the ASLS and SDI services.

In April 1984, the Department established the Brackishwater Aquaculture Information System (BRAIS) project, which is described under Information Programs.

Secretariat

In implementing its information program, the SEAFDEC Secretariat co-operates with other regional agencies and institutions as well as with national agencies and universities, both within and outside the region, that have a special interest in fisheries and aquaculture in Southeast Asia. The aim is to avoid duplication of effort and to foster cooperation among

the countries concerned.

One of the Secretariat's activities approved at the Tenth Meeting of the Council in 1977 is the dissemination of information on the Center's activities through the publication of the quarterly SEAFDEC Newsletter and other relevant documents. Currently 2715 subscribers in 73 countries or areas receive the SEAFDEC Newsletter which is distributed free of charge by surface mail (Appendix A).

Other SEAFDEC publications are cited in the List of SEAFDEC Publications, 1968-1984. This was updated by the Secretariat in February 1984.

Among these publications, special reference is made here to the updated issue of Organizations/Agencies concerned with Fisheries Development in Southeast Asia, published by the Secretariat in January 1984. This compilation includes sections on 34 organizations/agencies concerned with fisheries development in the region.

INFORMATION PROGRAMS

The International Development Research Centre (IDRC) of Canada has given impetus to three information projects undertaken by SEAFDEC at present. The projects are known as SAFIS, SEAFIS and BRAIS.

SAFIS Project

Since April 1982 the Secretariat has been actively engaged in a specialized information project known as SAFIS (Southeast Asian Fisheries Information Service), which is being financially supported for three years, ending March 1985, by the IRDC up to Canadian (CDN) $191,000.00, with counterpart contributions in kind from the Secretariat. Dr. K.I. Matics,

Information/Program Officer, has served as the Project Leader of SAFIS since its conception.

The immediate objectives of SAFIS are to publish fisheries extension manuals, brochures, pamphlets and related aids for small-scale fisheries development, and to translate selected literature from local languages into English and vice versa for distribution to fisheries extension personnel in Southeast Asia.

In addition to the three manuals, which were printed in 1983, namely:

SEC/SM/1 Khumua liang pla namcheut (Freshwater Fish Farming: How to begin) translated from English into Thai

SEC/SM/2 Oyster Culture, translated from Bahasa Malaysia into English

SEC/SM/3 Mussel Culture, translated from Bahasa Malaysia into English

SAFIS has been engaged in preparing the following:

SEC/SM/4 Ang pagpuna ug pagtapak sa pukot (Net Mending and Patching) translated from English into the Cebuano-Bisaya dialect of the Philippines

SEC/SM/5 Mussel Farming (original language English)

SEC/SM/6 Menternak Ikan Airtawar (Freshwater Fish Farming: How to begin) translated from English into Bahasa Malaysia

SEC/SM/7 Makanan dan Pemakanan Udang Harimau, Penaeus monodon (Nutrition and Feeding of Shrimp, Penaeus monodon) translated from Eng-

lish into Bahasa Malaysia

SEC/SM/8 Macrobrachium Culture, translated from Thai into English

SEC/SM/9 Selection of Marine Shrimp for Culture, translated from Thai into English

SEC/SM/10 Induced Breeding of Thai Silver Carp, translated from Thai into English.

These manuals are provided free upon request. The published texts may be obtained at a nominal cost of US $0.15 per photocopied page (including surface mail postage and handling services). There is an additional charge for air mail delivery.

SAFIS has distributed the following translations of short technical papers, which are also available upon request:

1. Breeding and Nursing of Young Sand Goby, translated from Thai into English.
2. Culture of Crocodile and Brackishwater Carp, translated from Bahasa Indonesia into English.
3. Culture of Fish in Floating Cages, translated from Bahasa Malaysia into English.
4. A Method of Carp Rearing in Running Water Ponds, translated from Bahasa Indonesia into English.
5. Rearing of Crabs in Pulau Tongkang, translated from Bahasa Malaysia into English.

Subject specialists are revising several other translations which will be published in due course.

SAFIS has moreover prepared an Acquisi-

tions List which includes nearly 700 entries. These have been in-put into a word processor, so that the acquisitions list can be readily up-dated periodically.

SAFIS is also engaged in the compilation of a Directory of Scientists and Technologists in Southeast Asia.

SEAFIS Project

The Memorandum of Grant Conditions for the Southeast Asian Fisheries Information System (SEAFIS) Project to be coordinated by the SEAFDEC Secretariat was signed on 28 March 1984. This project was the subject of one of the recommendations made during the Seminar on Fisheries Information Science in Southeast Asia, held in Bangkok from 16 to 20 August 1982. It will be financially supported for three years by the International Development Research Centre of Canada up to CDN $ 367,389 with counterpart contributions in kind from the SEAFDEC Secretariat. The aforementioned Information/Program Officer of the Secretariat has been designated as the Project Leader of the SEAFIS project.

The immediate aim of the project is to improve access to fisheries information in the region, with the full support and cooperation of the relevant national organizations in Southeast Asia. The project is also expected to strengthen coordination and cooperation among national fisheries institutes and to facilitate an efficient exchange of fisheries information.

The SEAFIS project comprises both information services and library services provided by the three Departments of SEAFDEC and the Secretariat. It is part of the Secretariat's response to numerous requests for information on various aspects of Southeast Asian fisheries from both governmental bodies

and private individuals within and outside the region.

The system has the following objectives:

(i) To provide a facility which can act as an impetus to decision-making and planning for fisheries development in the region and which would, in turn, accelerate the pace of economic development in Southeast Asia;

(ii) To act as a regional focal point and make available, in a centralized location, data and pertinent information on fisheries and related disciplines or technologies. Specifically, to collect, store, analyse and disseminate such information;

(iii) To serve as the Southeast Asian regional input center for the FAO Aquatic Science and Fisheries Information System (ASFIS) in Rome; and

(iv) To provide access to important current regional fisheries information (both published and unpublished).

In implementing the SEAFIS project mentioned above, the SEAFDEC Secretariat will follow these five stages:

Stage I Arrangements for closer cooperation among various libraries concerned with fisheries in Southeast Asia;

Stage II Establishment of a regional data base on Southeast Asian fisheries by the SEAFDEC Secretariat, on marine fisheries by the Training Department, on post-harvest technology by the Marine Fisheries Research Department, and on aquaculture by the Aquaculture Department;

Stage III Compilation of information relating to fisheries and aquaculture in South-

east Asia;

Stage IV Dissemination of information by means of a regional bibliography and specialized bibliographies with abstracts; and

Stage V Publication of relevant background documents relating to fisheries development in Southeast Asia.

SEAFIS is to serve as the regional input center for FAO's Aquatic Sciences and Fisheries Information System. Thus the Secretariat will coordinate the input from the three technical Departments of SEAFDEC which identify, collect, classify, catalogue, abstract and submit items which will eventually become part of the Aquatic Sciences and Fisheries Abstracts (ASFA) publications.

The overall objective of SEAFIS is to contribute to fisheries development by facilitating access to, exchange and use of fisheries information and data, as well as sharing information resources and experience available within and outside Southeast Asia. The system seeks to promote national self-reliance in fishery information within a framework of regional cooperation.

BRAIS Project

On 29 March 1984, the International Development Research Centre of Canada granted up to CDN $ 352,780 to establish the Brackishwater Aquaculture Information System project, with counterpart contributions in kind from the AQD. Thus the Department is organizing at its Main Research Station in Tigbauan, Iloilo, this specialized information analysis center to provide effective information services on brackishwater aquaculture. Mr. Emilio B. Gapit, AQD Librarian, has been

designated as the Coordinator of the BRAIS project.

BRAIS will consist of a processing center located at the AQD and input centers in each participating country, initially in three of the SEAFDEC Member Countries, i.e., Malaysia, the Philippines and Thailand, and eventually in India and Indonesia.

The Project will institutionalize the acquisition, organization and dissemination of brackishwater aquaculture information by establishing a network of cooperating and mutually reinforcing libraries and information centers to attend to the information needs of institutions or of individual researchers and development technologists.

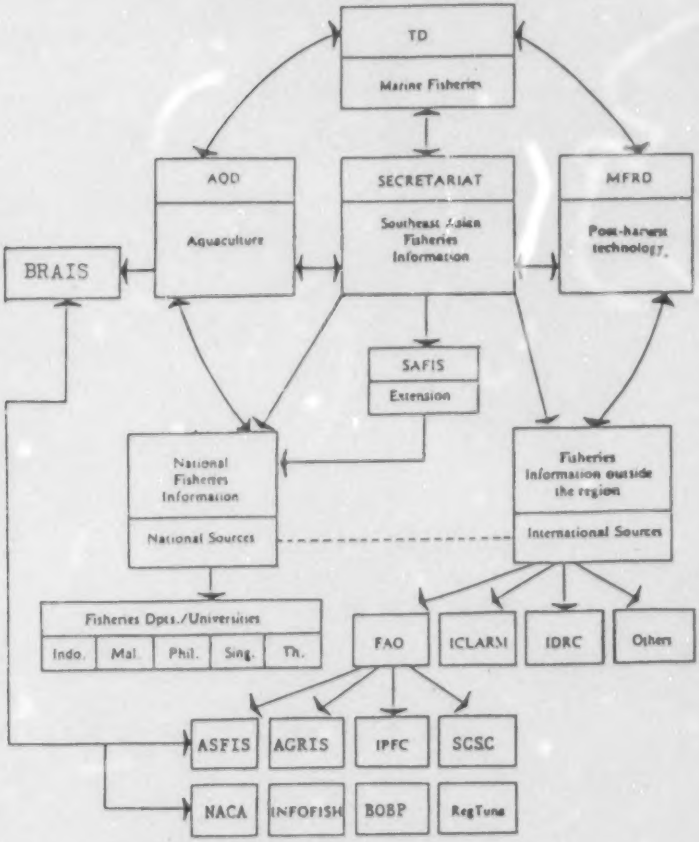
Satellite or national centers in each of the countries participating are being identified. The national centers will be responsible for the actual in-country survey and acquisition, organization and servicing of the information gathered, and for in-country dissemination.

BRAIS will collect documents on brackishwater aquaculture from the countries involved, set up a document storage and retrieval system, and carry out bibliographic searches for libraries, researchers, technologists, and development personnel. It will also establish a question-and-answer service for fish farmers and other information seekers, provide document delivery services, and maintain an up-to-date directory of researchers and research centers. BRAIS will circulate a quarterly current awareness newsletter, publish state-of-the-art reviews, and issue special bibliographies.

BRAIS will avoid duplication with existing information systems by cooperating through the SEAFDEC Secretariat with international

and regional information programs such as the ASFIS, Aquaculture Information System (AQUIS), and Agricultural Bank for Asia (AIBA).

Interrelationships Between SEAFDEC and National/International Organizations/Agencies Under the SEAFIS Project



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Appendix A

LIST OF SUBSCRIBERS TO SEAFDEC NEWSLETTER

ASIA		
Middle East		
Israel		4
Jordan		1
Saudi Arabia		2
	Subtotal	7
South Asia		
Bangladesh		15
India		44
Nepal		4
Pakistan		4
Sri Lanka		38
	Subtotal	105
East and Southeast Asia		
Brunei		9
Burma		9
China, People's Republic of		17
Hong Kong		30
Indonesia		191
Japan		141
Korea, Republic of		6
Laos		1
Malaysia		122
Philippines		962
Singapore		95
Taiwan (ROC)		15
Thailand		494
	Subtotal	2092
Pacific		
Australia		56
Caroline Island		1
Fiji Islands		8
French Polynesia (Tahiti)		2
Guam		1
Kiribati		2

New Caledonia		5
New Zealand		9
Papua New Guinea		7
Samoa		3
Solomon Islands		4
Vanuatu		1
	Subtotal	99

NORTH AND SOUTH AMERICA		
Argentina		1
Bermuda		2
Brazil		3
Canada		49
Colombia		3
Ecuador		1
Guatemala		1
Guyana		1
Jamaica		2
Mexico		2
Panama		1
Peru		2
St. Lucia		1
Surinam		1
Trinidad and Tobago		2
Uruguay		1
USA		155
Venezuela		1
	Subtotal	229

EUROPE	
Belgium	4
Denmark	9
Finland	1
France	23
Germany, Federal Republic of	30
Ireland	2
Italy	33
Netherlands	6
Norway	14
Sweden	9
Switzerland	4

United Kingdom		29
USSR		2
Yugoslavia		2
	Subtotal	168

AFRICA

Egypt		3
Ethiopia		1
Gambia		1
Ivory Coast, Republic of		2
Kenya		3
Madagascar		1
Nigeria		2
Senegal		1
Sudan		1
	Subtotal	15
	TOTAL	2715

FISHERIES LIBRARIANSHIP AT WOODS HOLE

Judith Brownlow, Librarian
Northeast Fisheries Center

This paper is an overview of fisheries librarianship at the federal fisheries laboratory in Woods Hole from its founding in 1871 to the present. Special attention is given to Rose MacDonald, Librarian 1903-1921, and her Analytical Subject Bibliography. Emphasis is placed on the current work performed by the library staff at the Northeast Fisheries Center Library at Woods Hole, special library services, collections and publications of the library staff, the role of the Fisheries Library and library staff in the recent U.S. - Canada Georges Bank boundary dispute, and cooperation within Woods Hole science library complex.

"The library has always proved to be an extremely important adjunct to this laboratory; and its use has not been restricted to investigators here, but has been extended to the whole scientific colony at Woods Hole... The permanent collection consists for the most part of government reports, and of separates donated by various authors. In addition to these, however, an extensive collection of standard biological works and periodicals has been loaned by the department of Anatomy of Brown University. While greatly appreciating the privilege of using these books, it is felt by the Bureau of Fisheries that the Woods Hole laboratory should possess a permanent and fairly adequate working library of its own. It is the Bureau's intention, therefore, to begin the purchase of more necessary works as soon as funds are available for the purpose."

This description of the Fisheries Library was written in Report of the Work of the Laboratory in 1906 by Director Francis B. Sumner and reprinted in Science magazine in 1907. The seeds of the modern day fisheries library were mentioned, including an early cooperative library agreement with a major university.

The object of this talk is to give a description of the Woods Hole laboratory library, its growth in relation to other institutional libraries in Woods Hole, and the work of its librarians. The idea for this talk came from my receipt from the National Personnel Records Center in St. Louis, Missouri, of the original personnel files of Rose MacDonald who was the librarian at this laboratory at the beginning of the century, from 1903 to 1905.

As Dr. Allard mentioned, the Woods Hole fisheries laboratory was the first field station of the newly formed federal agency, the U.S. Commission of Fish and Fisheries, with broadly based scientific programs. I will concentrate on the history of the library, rather than discuss the scientific programs in detail.

The earliest record of a librarian at the U.S. Fish Commission Woods Hole laboratory is in the Annual Report of the Director, 1904. Miss Rose MacDonald is mentioned in the 1904 report of the summer's work as follows: "A subject catalogue was commenced by the Librarian, Miss Rose MacDonald, in addition to the author catalogue already on hand." The library itself certainly precedes the 1904 date and was probably started sometime after 1885, the date of the completion of the U.S. Fish Commission building in Woods Hole. In 1905, Rose MacDonald was hired as a clerk in the Washington office of the

U.S. Fish Commission. Her title was changed to Librarian in 1907.

Rose MacDonald's greatest contribution to the Bureau of Fisheries was the "Analytical Subject Bibliography of the Publications of the Bureau of Fisheries, 1871-1920," Bureau of Fisheries Document No. 899, published as Appendix to the Report of the U.S. Commissioner of Fisheries for 1920. This index required an in-depth knowledge of the Bureau's publications in order to classify them properly in the 13 part index which was further sub-classified by finer divisions, such as family names of marine organisms, common names of fishes and geographical locations. Well over 2500 publications were analyzed, for the most part in the Reports and Bulletins of the U.S. Fish Commission. Her position description reads: "Making an analytical index of all publications of the Bureau; this necessitates a careful reading of all articles issued." The completion of the analytical subject index took 8 years, having been started in 1912 and completed in 1920. Miss MacDonald's letter of transmittal with the index reads:

> "Covering the investigations of the Bureau since its incipiency, it shows in a measure the work of a number of men of no mean fame in the field of biology. Much of it was pioneer work, which modern investigators cannot afford to ignore... It has long been realized and often stated by those cognizant of the ideals of the Bureau that there was a veritable fund of valuable information in the publications of the Bureau, which was lost because the modern investigator knew not how to find them. It is hoped that this work will provide a valuable key."

In addition to her work on the Analytical Index, Miss MacDonald was required to read and catalog by subject each scientific article that was received in the Washington, D.C. library, purchase and catalog all the books, compile subject bibliographies, and handle library correspondence. She was also responsible for book selection and site visits "for the purpose of arranging and cataloging" in field locations of the Bureau in Woods Hole, Massachusetts; Beaufort, North Carolina; Fairport, Ohio; and Key West, Florida.

The first index to government fisheries publications was followed by 5 others, covering successive time periods up to 1979. The second index, covering government publications from 1920 to 1954 was also compiled by librarians. The most recent published index covers publications from 1975 to 1979. The index covering the years 1980 to 1984 is due to be published in late 1985. (NOTE: A list of the indexes is provided at the end of this paper.) Current publications, after 1979, from the National ~~Marine~~ Fisheries Service can be accessed through searching several on-line data bases, such as NTIS, ASFA (Aquatic Sciences and Fisheries Abstracts), and BIOSIS Previews. The printed indexes can be requested from NOAA's Library and Information Services Division in Rockville, Maryland. A private company, UPDATA Corporation, in Los Angeles, California, will supply the indexes on microfiche to anyone who purchases their microfiche NMFS publication set which contains Marine Fisheries Review, Fishery Bulletin, and Special Scientific Reports - Fisheries.

There is a long period of time, 1905 through 1955, where there is no record of a librarian at the Woods Hole laboratory. The laboratory continued to do important

scientific work, however. From 1912 to 1921, in cooperation with Henry B. Bigelow of the Museum of Comparative Zoology at Harvard University, the laboratory performed an oceanographic and biological survey of the Gulf of Maine.

The results were published in three major monographs:

Bigelow, H.B. and W. Welsh. 1925. Fishes of the Gulf of Maine. Fishery Bulletin. 40 (1).

Bigelow, H.B. 1926. Plankton of the Gulf of Maine. Fishery Bulletin. 40 (2).

Bigelow, H.B. 1927. Physical Oceanography of the Gulf of Maine. Fishery Bulletin. 40 (2).

The laboratory was also used by the offices of the North Atlantic Fisheries Investigations in Cambridge during the summer months. Tagging studies on the migration of mackerel were done by O.E. Sette in the 1930's. William Schroeder conducted tagging experiments on cod to discern their migration patterns in the late 1920's. The results of these migration studies were published in the Fishery Bulletin.

Although there was no librarian during this period of 50 years, there was a physical library collection which continued to grow. It was kept on the 3rd floor of the old Fish Commission building. The modern period of the library started in 1948 with the move of the North Atlantic Fisheries Investigations, part of the U.S. Fish and Wildlife Service Branch of Fishery Biology, to Woods Hole. The biologists with the North Atlantic Fisheries Investigations brought with them private collections of industry journals which were given to the library. Some of these were

put in storage and have not been retrieved until recently. Thus we have fairly complete sets of several fishing industry journals in hard copy, such as National Fisherman, Fishing Gazette and the Annual Reports of the Boston Fish Bureau. These are currently being bound and we are looking into microfilming some of the rarer titles.

In 1951, the Woods Hole laboratory became the U.S. representative in a new scientific research and regulatory body, the International Commission for the Northwest Atlantic Fisheries (ICNAF). In 1955 funds from the Saltonstall - Kennedy Act made expansion of the laboratory's research programs possible, and more staff were hired, including a Library Assistant, Ms. Elizabeth Leonard. Since 1955, the library has been staffed full-time. A biologist, Ms. Patricia Gerrior, ran the library from 1970 to 1973.

In the modern era, our staff does most of the traditional work done in a special library: reference, library research, online literature searching, cataloging, binding, handling library correspondence, etc. The library staff also handles the listing, storing and binding of the Woods Hole Laboratory Reference Document Series. This is a "grey" literature series which means that it does not receive peer review or editing for content. Most of these documents are stock assessments of one of the commercially important species from the Gulf of Maine, Georges Bank, Southern New England and Mid- Atlantic Bight areas. Woods Hole laboratory staff publications are listed and kept in the library. Since the Northeast Fisheries Center was formed in 1977, the library staff has compiled the "Collected Reprints" for the eight laboratories in the Center. The "Collected

Reprints" contain formal publications arranged by laboratory. A main index by author is compiled for each year. In addition, we have been involved in many special projects some of which deserve mention.

MARITIME BOUNDARY DELIMITATION

Most of you are probably familiar with the Case in World Court between the U.S. and Canada which concerns a maritime boundary delimitation over the Georges Bank area. This case was presented at the International Court of Justice in 1982. Both countries claimed the upper third of Georges Bank, which is a productive offshore fishing area. The case was presented to World Court for resolution.

Our library was used heavily for backup references throughout the case and for use by visiting experts commissioned by the U.S. State Department. The library staff played a direct role in preparing information for this case in several ways, as I will describe.

A document compiled by a member of the library staff was used as an entry in the U.S. Counter Memorial presented in 1982. The title of the document was: ICNAF/NAFO Scientific Papers on Georges Bank and the Gulf of Maine by Country, 1951-1981. It was issued as Woods Hole Laboratory Reference Document no. 83-31. The document listed the scientific research papers submitted to ICNAF written on Georges Bank and Gulf of Maine broken down by the country of affiliation of the author. The tables at the end of the document showed that U.S. authors had contributed more papers on Georges Bank during the time period 1951 to 1976 than any other country belonging to ICNAF.

The library staff played an important part in obtaining references for the Marine Environmental Annex of the Counter-Memorial and reply of the U.S.-Canada Maritime Boundary Delimitation. One of the arguments in the Environmental Annex was that Georges Bank was an enclosed ecosystem which could be managed most effectively by one country. On June 3, 1983, 91 references were supplied in triplicate. They were identified from citations which were incomplete, containing only an author, date, and a brief title. In the days April 20 to April 22, 1984, 93 papers on herring, 32 papers on cod, 41 papers on yellowtail flounder and one on haddock were identified from author, year and brief subject citations. In all, 167 papers were located in a three-day period. Almost all of these papers were in the Woods Hole laboratory library. Several were found at the MBL Library and at other laboratories in the Center. The citations were supplied by biologists familiar with the literature of a particular species in the Gulf of Maine, Georges Bank and Southern New England. By the time the citations were given to the library, the source was missing, so the source had to be verified. Some of the citations were for unpublished papers and theses. The papers covered the time period 1920 to 1983 and were by U.S. and Canadian authors. The decision from the International Court of Justice is due this month. A compromise decision is expected. The memorials, counter-memorials, and replies of the Case were given to the library.

GEORGES BANK FISHING HISTORY

A member of the library staff, Susan Rock-

well, coauthored a history of Georges Bank fisheries for publication as a chapter in the forthcoming book, Georges Bank, from Woods Hole Oceanographic Institution. Most of the sources and references needed to write this history were available in our library. A history manuscript prepared by Ms. Rockwell was used as background material at the International Court of Justice in the Hague in favor of the U.S. position in the US.-Canada Maritime Boundary Delimitation Case, for which she received a letter of commendation.

INTERRELATEDNESS OF MODERN WOODS HOLE SCIENCE LIBRARIES

The Fisheries Library has always been a specialized collection acquiring materials of immediate interest to the scientists at the Woods Hole laboratory. The close proximity of the Marine Biological Laboratory (MBL) Library greatly influenced the development of our collection. The MBL Library was planned as a comprehensive biological collection from its inception. It also developed strengths in oceanography, meteorology, fisheries and other fields. In 1930, the Woods Hole Oceanographic Institution (WHOI) decided to use the MBL Library rather than build a library of its own. Later, WHOI developed two special libraries: the Document Library (for technical reports) and the Data Library. The cooperation among the institutions in regards to sharing library resources has always been strong. This resource sharing is documented in the annual reports of the institutions.

Presently, the National Marine Fisheries Service Library in Woods Hole remains a spe-

cialized collection with the emphasis on fisheries science, which is multidisciplinary, fishing industry publications and documents from two international commissions (the International Council for the Exploration of the Sea and the Northwest Atlantic Fisheries Organization, formerly the International Commission for the Northwest Atlantic Fisheries). The collection is also strong in U.S government publications of the National Marine Fisheries Service and its predecessor agencies.

In summary, the National Marine Fisheries Service Library in Woods Hole is a combination of old and new fisheries literature. Its collection and library staff have been a valuable information support for decades. Librarians of the Woods Hole fisheries laboratory have given valuable contributions to the government starting with Rose MacDonald's Analytical Subject Index in 1921 through the specialized information support to the U.S. case in the Maritime Boundary delimitation over Georges Bank resolved in 1984.

KEY HISTORICAL DATA IN FISHERIES LABORATORY HISTORY

1871. U.S. Commission of Fish and Fisheries founded.

1885. U.S. Fish Commission building completed in Woods Hole.

1888. Marine Biological Laboratory founded.

1930. Woods Hole Oceanographic Institution founded.

1948. North Atlantic Fishery Investigations moved from Cambridge to Woods Hole, Massachusetts. ALBATROSS III commissioned.

1951. ICNAF founded.

1955. Research programs greatly expanded and the research vessel ALBATROSS III was reactivated through additional funds made available to the laboratory from the Saltonstall-Kennedy Act (Public Law No. 466).

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